'Not in accordance with Ptolemy in some details'

«Not in accordance with Ptolemy in some details»:

A late antique revision of the *Handy Tables*

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At the beginning of his treatise *On the construction of an Aratean sphere*, written in the mid-sixth century AD, the Alexandrian scholar Leontius Mechanicus[1] addresses his dedicatee, the young apprentice Theodorus, with the following words:

> Πᾶσαι γάρ, ὡς οἶσθα, αἱ νῦν φερόμεναι σφαῖραι Πτολεμαίῳ μέν, ὡς εἰκός, ἔν τισιν, Ἀράτῳ δὲ κατὰ τὸ πλεῖστον οὐ συμφωνοῦσιν.
>
> For, as you know, all the spheres currently available are not in accordance with Ptolemy in some details, as it is reasonable, but with Aratus they disagree in most of the information.

It seems natural, on the one side, that late antique celestial cartography should disagree with «most of the information» found in Aratus' *Phaenomena*, written almost eight centuries earlier: the exceptional development of astronomical knowledge in the Hellenistic and Imperial periods had outdated many of Aratus' assumptions about the organisation of the celestial sphere and its constellations. More interesting, and at first sight surprising, is Leontius' remark that «the spheres currently available» in his times were «not in accordance with Ptolemy in some details»; and, moreover, that such discordances could be qualified as «reasonable» («εἰκός»). Such a statement raises some questions about the reception of Ptolemy's astronomical works in late antiquity, in particular about the possibility of criticisms and corrections of, or integrations to, the received Ptolemaic sets of data: this is all the more puzzling since the generally accepted picture of late

[1] The present article develops some thoughts which originated during my work on a new edition of Leontius' treatise, which is currently in press (Guidetti forthcoming). I hereby express my thanks to Dr. Olivier Defaux (Max-Planck-Institut für Wissenschaftsgeschichte, Berlin), who read a preliminary version of this article and improved it with several useful comments; the edition of Ptolemy's *Table of the Distances of the Fixed Stars*, published in Appendix, has greatly profited from the help of Dr. Luca Ruggeri (Scuola Normale Superiore, Pisa), who has also supplied his conjectures for some of the most desperate points of the text. Of course, the responsibility for any mistakes and insufficiencies is only mine.

antique astronomy is one of faithful (if not blind) compliance to Ptolemy's authority, as is shown by the considerable amount of exegetic literature on his works, closely linked to the teaching activities in the astronomical school of Alexandria. Leontius' passing remark does not harmonise with such a picture, and therefore deserves closer scrutiny: the following pages will show how Leontius' words can contribute to a more nuanced reconstruction of the relation of late antique astronomers to Ptolemy's authority, and of their role in the development of scientific knowledge between the end of antiquity and the beginning of the Middle Ages.

The use of the verb συμφωνέω in the passage quoted above is sufficient, in my opinion, to dismiss the most banal explanation, according to which Leontius, by saying that «all the spheres currently available are not in accordance with Ptolemy in some details», would simply be denouncing the lack of exactitude of such astronomical instruments. The verb συμφωνέω and its related words (the noun συμφωνία, the adjective σύμφωνος, the adverb συμφώνως) are commonly used in Greek scientific texts as *termini technici* to express the agreement between two or more sources of authority, for example two authors[2] or two works by the same author[3]; the term could also indicate the agreement between theory and observation (συμφωνία πρὸς τὰ φαινόμενα)[4], or the existence of a *consensus* among the scientific community[5]. On the other hand, no ancient author (at least to my knowledge) ever mentions the lack of συμφωνία as a consequence of the limited accuracy of the available scientific instruments – an aspect in which, as is known, Greco-Roman astronomers had much more limited expectations than their modern counterparts. Moreover, the lack of agreement «in some details» («ἔν τισιν») with respect to Ptolemy's indications is presented by Leontius not as a reason to criticise the manufacturers of celestial spheres, but rather as

[2] For example, at the end of book 1 of the *Almagest* Ptolemy accepts Eratosthenes' value for the obliquity of the ecliptic, mentioning it with the words «τὸν συμπεφωνημένον ἡμῖν … λόγον» («the ratio with which I have agreed»): PTOL. *Alm.* 1,14 (vol. 1, p. 77,23-25 Heiberg).

[3] The fourth-century astronomer Theon of Alexandria dedicates a chapter of his *Commentary to Ptolemy's Almagest* to prove the consistency between the *Almagest* and the *Handy Tables*, showing that the calculations carried out according to the two Ptolemaic works lead to the same results: THEON AL. *in Ptol. Alm.* 3,8 (pp. 912,1-916,25 Rome); the title of the chapter reads: *Περὶ τῆς συμφωνίας τῶν κατὰ τὴν Σύνταξιν καὶ τὸν Πρόχειρον ψηφοφοριῶν* (*On the agreement between the calculations carried out according to the Syntaxis and those carried out according to the Handbook*).

[4] In the *Almagest* Ptolemy often emphasises the agreement between his own theoretical models and the data coming from observation. See for example PTOL. *Alm.* 1,8 (vol. 1, p. 26,6-12 Heiberg), where the author states that the correctness of his own initial postulates will be confirmed «ἐξ αὐτῆς τῆς τῶν ἀκολούθως καὶ ἐφεξῆς ἀποδειχθησομένων πρὸς τὰ φαινόμενα συμφωνίας» («by the very agreement between what will be later demonstrated on their basis and what can be observed»); in a similar way, in PTOL. *Alm.* 3,4 (vol. 1, p. 232,9-10 Heiberg) the author argues in favour of his own method of calculating the anomaly of the movement of the sun by stating: «καὶ τοῦτο γὰρ σύμφωνον ὂν εὑρίσκομεν τοῖς φαινομένοις» («this result which I have found, too, agrees with what can be observed»).

[5] In a famous passage of his *Commentary to the Phaenomena of Aratus and Eudoxus*, Hipparchus criticises the inexactitude of the Aratean value for the geographical latitude of Greece by showing that the ratio between the gnomon and the length of the equinoctial shadow in Greece, about which «there is general agreement» («συμφωνεῖται»), is incompatible with the latitude assumed by Aratus (HIPPARCH. 1,3,6).

something «reasonable» («εἰκός»). These verbal clues invite us to interpret the discrepancies noted by Leontius as a consequence not of mere technical inaccuracies, but rather of conscious, if probably minor, deviations from some of Ptolemy's data.

The astronomical instrument mentioned by Leontius belongs to the genre of the solid sphere (the one which Cicero calls «sphaera solida atque plena»), whose surface reproduces the external face of the sphere of the fixed stars, accommodating the depictions of the celestial circles and the constellations[6]: this kind of astronomical instrument was known, in Leontius' times, as the 'sphere of Aratus' or 'Aratean sphere' (Ἀρατεία σφαῖρα), because it was used for the teaching of astronomy in close association with the reading of Aratus' *Phaenomena*, as a visual aid to help students memorise the shapes of the constellations and their positions in the sky. Consequently, if some deviations from Ptolemy's description of the sky were found in this genre of celestial cartography, this means that the data on the positions of the individual stars, on which basis such spheres were drawn, were (at least in some instances) different from those found in the two Ptolemaic star catalogues: the complete catalogue of the fixed stars, included in books 7 and 8 of the *Almagest*, and the catalogue of the brightest stars within 10° north and south of the ecliptic, included in the *Handy Tables*. Is it possible to find an explanation for such discrepancies?

One obvious reason of disagreement between late antique celestial cartography and the data registered in Ptolemy's star catalogue could be the phenomenon of precession, i.e. (explained with the terms used by ancient astronomers) the slight but regular shifting of the whole sphere of the fixed stars with respect to the solstitial and equinoctial points. Ptolemy was of course well aware of this phenomenon, which had been identified by Hipparchus already in the Hellenistic period, and calculated for it the approximate value of 1° of shift every 100 years (which is actually underestimated of ca. 40% with respect to the real mean value of 1° every 71.6 years): as a consequence, all the longitudes of the fixed stars found in Ptolemy's catalogues were explicitly supposed to be updated by applying this coefficient of precession, depending on the amount of time elapsed between the production of the catalogues themselves (i.e. the mid-second century AD) and their consultation. While in medieval times, both in Arabic- and Latin-speaking contexts, astronomers tended to produce new catalogues whose values had been updated taking into account the effect of precession, throughout antiquity the old Ptolemaic tables continued to be regularly used without modifications: it was their user who was supposed to calculate the effect of

[6] See Cic. *rep.* 1,14,21-22 on the difference between such solid spheres and the so-called 'sphere of Archimedes', a mechanical device whose purpose was to reproduce the periods of planetary motions.

precession for his own time. For example, an astronomer working in the mid-sixth century AD, 400 years after Ptolemy, would have known that he had to subtract 4° from every longitude value that he found in Ptolemy's star catalogues.

It is difficult to imagine how this problem was dealt with in the field of celestial cartography. For sure, Ptolemy himself had envisaged a special kind of sphere in which the solstitial and equinoctial points were movable, so that the phenomenon of precession could be taken into consideration directly while using the instrument, without need of previous or successive calculations: the procedure for the fabrication of such a sphere is described in book 8 of the *Almagest* (PTOL. *Alm*. 8,3 [vol. 2, pp. 179,21-185,4 Heiberg]), and a sort of 'users' manual' is included in a late antique *scholion*, probably from the sixth century, recently published by Anne Tihon[7]. However, it seems that this sophisticated instrument was never a serious competitor to the traditional spheres, in which the solstitial and equinoctial points were drawn directly on the surface, and were thus unmovable: these continue to be widely attested in later astronomical sources, which testify their uninterrupted use for descriptive and didactic purposes. Given the fact that no such sphere is preserved, however, we are not able to tell with certainty whether the instruments available in the imperial and late antique period depicted a contemporary or updated sky, i.e. automatically incorporating the changes due to the effect of precession, or rather a conventional Ptolemaic sky, to which the users themselves should add the value of the precession, as it was the case with the star catalogues. But Leontius' choice of words offers, in my opinion, a good argument in favour of the latter theory: the use of the expression «ἔν τισιν», «in some details», is much more easily understandable as referring to a plurality of small individual corrections, rather than a single substantial modification concerning the whole surface of the sphere, as would be the case if a general update had been performed with the aim of taking into account the phenomenon of precession.

If this interpretation is true, one should expect to find, in other late antique scientific sources, references to some verifications or corrections of the Ptolemaic astronomical data, providing a confirmation of what I have argued on the sole basis of Leontius' passing remark. Such acknowledgment would be all the more significant, since the common opinion among the historians of science still considers late antiquity as a rather backward period in the development of astronomical studies, attributing the first attempt towards a verification of Ptolemy's data only to the Arab astronomers of the first half of the ninth century. In this period a new star table, containing

[7] Tihon 2015, pp. 20-22.

values for the positions of 24 notable stars, was produced as part of the so-called *Mumtaḥan zīj* (*Verified table*): this work, due to the initiative of the caliph al-Maʾmūn, was based on two systematic observational campaigns carried out by a group of astronomers in Baghdad and Damascus, under the direction of Yaḥyā b. Abī Manṣūr, in the years 829-833 AD[8]. As Mohammad Mozaffari has shown, this star table was produced through a mix of actual observations and computational updating of the Ptolemaic data based on a recalculated precession value of 1° every 66 years[9]. Now, Leontius' remark opens the possibility that comparable attempts to verify and improve Ptolemy's star catalogues, if surely less systematic and without a direct input from the central political power, had already started 300 years earlier, by the initiative of Ptolemy's successors in the astronomical school of Alexandria[10].

Otto Neugebauer, in what is still the most authoritative work on the history of ancient astronomy, ruled out decidedly this possibility. In his words[11]:

> Today it would seem obvious that Ptolemy's observations should have been repeated and refined by comparing them with the predictions from the theory. This would have resulted inevitably in the recognition of systematic deviations and thus in corrections for the basic parameters of the models. [...] We know that this did not happen, but to seek the causes lies outside the topic of the present work. It will suffice to remark that

[8] On al-Maʾmūn's *Verified table* see Kennedy 1956, pp. 145-147 e 169-170; Vernet 1956; King, Samsó, Goldstein 2001, pp. 36-39; van Dalen 2004; Mozaffari 2016-2017. According to Mozaffari 2016-2017, p. 70, the original ninth-century version of this table, prior to the revision and updating made by the Persian astronomer Ibn al-Aʾlam in the second half of the tenth century, is known today only from one manuscript (El Escorial, Real Biblioteca del Monasterio de San Lorenzo, ms. árabe 927, p. 188). Some of the materials included in the *Mumtaḥan zīj* were used by Stephen of Antioch, probably in the second quarter of the twelfth century, for the compilation of his *Liber Mamonis* (*Book of al-Maʾmūn*); a comprehensive study of this work by Dr. Dirk Grupe is forthcoming: for now see Burnett 2003, part. pp. 34-36.

[9] Mozaffari 2016-2017, pp. 75-80.

[10] On the contrary, if we accept the idea that there was no attempt to revise and update the coordinates of Ptolemy's star catalogues prior to the *Mumtaḥan zīj* in the second quarter of the ninth century, then Leontius' reference to deviations from the Ptolemaic data would imply his knowledge of this work, and by consequence a date not earlier than the mid-ninth century for Leontius himself: were this true, Leontius' text would be the first explicit witness to the reception of Islamic astronomy in Byzantium. But, as far as we know, the *Mumtaḥan zīj* had no immediate diffusion in Christian contexts: on the contrary, the interest of Byzantine astronomers for Islamic science is not attested until the eleventh century, and, when it started, it focused primarily on the most updated materials, i.e. the revised table prepared by Ibn al-Aʾlam in the tenth century. Two centuries after its production, the *Mumtaḥan zīj* itself was not available, and probably not even much interesting, to Byzantine scholars. Moreover, every clue in Leontius' text points to a date in late antiquity rather than in the middle Byzantine period: not only his language finds its closest parallels in Alexandrian scientific authors of the sixth century (especially John Philoponus and Olympiodorus), but, most of all, the institutionalised, curricular educational context implied by Leontius' treatise was much more typical of the later Roman empire than of middle Byzantine Constantinople. I delve more deeply into these issues, with an analysis of the available sources, in the introduction to my forthcoming edition of Leontius' text.

[11] Neugebauer 1975, p. 942.

there were many external and internal events in the time of the later Roman Empire which created a cultural climate unfavorable to scientific research.

A closer look at late antique astronomical literature, however, shows a partially different picture: sixth-century sources attest beyond any doubt that Ptolemy's observations were indeed «repeated and refined by comparing them with predictions from the theory». But it is certainly true that such repeated observations never turned into a veritable campaign, thus preventing «the recognition of systematic deviations», not to mention «corrections for the basic parameters of the models»: apparently the connection between the repetition of observations and the recognition of systematic deviations, although posited as 'inevitable' by Neugebauer, ultimately did not take place.

Leontius' mention of a revision of the Ptolemaic data can indeed be confirmed by another late antique text, transmitted among the introductory materials to the *Almagest* in three Byzantine manuscripts: Venezia, Biblioteca Nazionale Marciana, ms. Gr. Z. 313 (=690) (**C** in Heiberg's *stemma codicum*), f. 29v; Paris, Bibliothèque Nationale de France, ms. Grec 2390 (**F**), f. 14v; Città del Vaticano, Biblioteca Apostolica Vaticana, ms. Vat. gr. 184 (**G**), f. 24v. This text, edited in 1907 by Heiberg in the *Prolegomena* to his edition of Ptolemy's astronomical works[12], records a series of planetary conjunctions observed between the end of the fifth and the beginning of the sixth century AD[13]. The text begins with a copyist's note («Ταῦτα ἀπὸ τοῦ ἀντιγράφου τοῦ φιλοσόφου ἔγραψα», «I wrote down these notes from the philosopher's copy»), informing that it was originally found among the materials in possession of an unnamed professor; this φιλόσοφος was most probably the same Heliodorus who, immediately after this short introductory statement, begins recording his own observations of the sky in the first person: «Εἶδον Ἡλιόδωρος…», «I, Heliodorus, observed…». This Heliodorus can be identified with a well-known Alexandrian astronomer of the sixth century, son of the philosophers Hermias and Aedesia, brother of the philosopher and astronomer Ammonius, who was a student of Proclus in Athens and later taught, together with his brother, in the school of Alexandria. The main source of information about Heliodorus are the two entries in the *Suda* lexicon devoted to his parents, both derived from Damascius' *Philosophical History*[14]. Even

[12] Heiberg 1907, pp. XXXV-XXXVII.

[13] The astronomical content of this short text is best analysed by Neugebauer 1975, pp. 1038-1041.

[14] The first passage presents Heliodorus and his brother as young students in Athens (SUID. *s.v.* Αἰδεσία [αι 79], vol. 2, p. 162,13-20 Adler): «Ταύτης δὲ [scil. Αἰδεσίας] παῖδες ἀπὸ τοῦ Ἑρμείου νεώτερος μὲν Ἡλιόδωρος, πρεσβύτης δὲ Ἀμμώνιος. Οὗτος μὲν οὖν εὐφυέστερος ἦν καὶ φιλομαθέστερος, ὁ δὲ ἁπλούστερος καὶ ἐπιπολαιότερος ἔν τε τοῖς ἤθεσιν ἔν τε τοῖς λόγοις. Ἄμφω μὲν γὰρ ἐφιλοσοφησάτην ὑπὸ Πρόκλῳ μετὰ τῆς μητρὸς ὡς αὐτὸν ἀφικομένω παιδαγωγούσης. Καὶ ὁ Πρόκλος αὐτοῖς προσεῖχε τὸν νοῦν ἐπιμελέστερον ὡς παισὶν Ἑρμείου, φίλου τε καὶ ἑταίρου ἀνδρός, παισὶ δὲ Αἰδεσίας, τῆς γένει Συριανῷ προσηκούσης καὶ ἅμα σφίσι τὸ τηνικαῦτα παρούσης» («Aedesia's sons

if Damascius portrays Heliodorus as the rather ordinary younger brother of the brilliant Ammonius, the astronomical observations recorded under his name show a very high degree of accuracy, as well as a rather open-minded handling of the Ptolemaic data: we can suppose that Heliodorus was simply more devoted to astronomical practice than to philosophical speculation, and this could well be the reason behind the underestimation of his abilities by Damascius, whose interests lay mainly in philosophical matters. In any case, Heliodorus' observational records find their place quite well within the context of the Alexandrian school of astronomy, that is, at the very centre of late antique scientific studies: Heiberg himself used this short text to prove that two of the earliest extant copies of the *Almagest*, his already mentioned codex **C** and the manuscript now in Città del Vaticano, Biblioteca Apostolica Vaticana, ms. Vat. gr. 1594 (**B**), derive from a sixth-century sub-archetype written, if not for Heliodorus himself, at least within the school of Alexandria at the beginning of the sixth century[15].

The text records seven planetary conjunctions: five observations were carried out by Heliodorus himself, one in AD 498 and four in AD 508-509; another was made in AD 502 by Heliodorus and Ammonius together[16], while the earliest one, carried out in Athens in AD 475, can be attributed to their teacher Proclus[17]. The two last observations are particularly interesting,

from Hermias were the younger Heliodorus and the older Ammonius. The latter was more talented and more passionate for knowledge, while the other was simpler and more superficial in his manners and conversations. Both studied philosophy with Proclus, and their mother used to accompany them when they went to him. And Proclus devoted his attention to them with particular care, as sons of Hermias, a man who was his friend and comrade, and as sons of Aidesia, who was a relative of Syrianus by birth and was present with them at that time»). The second passage (SUID. *s.v.* Ἑρμείας [ε 3035], vol. 2, p. 412,22-23 Adler) briefly mentions both Ammonius and Heliodorus as teachers of Damascius.

[15] Heiberg 1907, pp. XXXIV-XXXVII. The text recording Heliodorus' observations is included among the introductory materials to the *Almagest* in the codex **C** (f. 29v); it no longer exists in **B**, whose introductory section is now damaged, but it is present in its descendant **F** (f. 14v): from this we can infer that it was originally included in **B** too. This is confirmed also by the codex **G**: although the latter belongs to a different family of manuscripts, its scribe used also **B** (or a very close relative of **B**) throughout its writing and correction (as shown by Heiberg 1907, pp. CXVIII-CXXI), probably copying Heliodorus' text from that same source.

[16] Heiberg 1907, p. XXXV,7: «ἐγώ τε καὶ ὁ φιλώτατος ἀδελφὸς».

[17] *Contra* Neugebauer 1975, p. 1039: «there is no good reason to associate the observation III with Proclus». In reality, the record of this observation is peculiar not only because of its early date, but also because of the explicit mention of the place where it was carried out, i.e. Athens (on the other hand, we can assume that all the remaining observations were made in Alexandria, where Heliodorus' and Ammonius' scientific activity took place). The record is preceded and followed by the annotation «Τοῦ θείου τήρησις», «Observation made by the Divine»: Paul Tannery was the first to identify 'the Divine' as the philosopher Proclus, who could well be addressed with such a respectful epithet by one of his former students (Tannery 1894a, p. 20, note 1; Tannery 1894b, p. 13, note 2). The two identical annotations, in my opinion, are not to be understood as introducing two subsequent observational records: indeed, the following entry, dated to AD 508, has nothing to do with the previous one, and is much more easily understood as the first in the series of observations carried out by Heliodorus himself in Alexandria in AD 508-509. It seems to me more plausible that the remark «Τοῦ θείου τήρησις» is repeated before and after the entry to which it refers, with the purpose of singling out the exceptional status of this observation, which, although non autoptic, was nonetheless included in the group because it was supported by the authority of the 'divine' philosopher. If we break the association between the second «Τοῦ θείου τήρησις» and the observation carried out in AD 508, then Neugebauer's main objection to the identification of

because they include an explicit comparison between the observed phenomena and the predictions based on astronomical calculations[18]:

> 6. Τῷ αὐτῷ σκε Παυνὶ θι μετὰ ἡλίου δυσμὰς ὁ τοῦ Ἄρεως συνῆψεν τῷ τοῦ Διὸς ὡς δοκεῖν αὐτοῦ διεστάναι εἰς μὲν τὰ προηγούμενα δάκτυλον α, πρὸς δὲ νότον δακτύλους β, καίτοι τῶν ἀπὸ τοῦ Κανόνος καὶ τῆς Συντάξεως ἀριθμῶν τῇ κγ τοῦ αὐτοῦ μηνὸς δεικνύντων αὐτοὺς ἰσομοίρους, ὅτε πλεῖστον παραλλάττοντες ὤφθησαν.
> 7. Ἀπὸ Διοκλητιανοῦ σκς <...>[19] ὤφθη ὁ τῆς Ἀφροδίτης ἀστὴρ προηγούμενος τοῦ τοῦ Διὸς ὡς δακτύλους η, τῇ δὲ κη ἑπόμενος ὡς δακτύλους ι· κατὰ δὲ πλάτος οὐδὲν ἐδόκουν διαφέρειν. Κατὰ μέντοι τὰς ἐφημερίδας ἔχρην τῇ τριακάδι φαίνεσθαι αὐτοὺς συνάπτοντας· τότε δὲ πλεῖστον διεστῶτες ὤφθησαν.

> 6. In the same year 225, on the 19th day of the month of Pavnì, after the setting of the Sun, the planet Mars was in conjunction with the planet Jupiter, so that its visible distance from it was 1 digit in direction west and 2 digits in direction south, although the calculations made on the basis of the *Tables* and the *Almagest* predicted that they would be in the same position on the 23rd day of the same month, a moment in which they were observed to be considerably out of alignment.
> 7. In the year 226 of Diocletian, <on the ... day of the month of ...>, the planet Venus was observed at a distance of 8 digits west of the planet Jupiter, and on the 28th at a distance of 10 digits east; they were at no visible distance, on the contrary, for what concerns their latitude. Yet, according to the ephemerides, they had to be observed in conjunction on the 30th: but on that day they were observed at a considerable distance.

'the Divine' as Proclus (namely, that in AD 508 Proclus was already dead) is also removed. The solution proposed, admittedly in a very cautious way, by Westerink 1971, p. 20, note 27, interpreting θεῖος as meaning 'uncle' and referring to Hermias' brother Gregorius (on which see PHOT. *bibl*. 242,75 [vol. 6, pp. 24,33-25,3 Henry] and SUID. *s.v.* Γρηγόριος [γ 453], vol. 1, p. 543,8-15 Adler, both drawing again from Damascius), is both unnecessary and unsatisfactory. On the one hand, the presence of the epithet ὁ θεῖος without the proper name is, in my opinion, not so strange if we keep in mind that these notes were not originally meant for publication: Heliodorus could easily refer to his teacher by using simply a deferential epithet, without any need of explicitly writing down his name, which he of course knew very well; on the contrary, Heliodorus' use of the mere qualification 'the uncle' to refer to an older member of the family would be very ill-mannered, and is at odds with the much more respectful mention of Ammonius as «ὁ φιλώτατος ἀδελφὸς».

[18] Heiberg 1907, pp. XXXVI,18-XXXVII,8.

[19] The exact date and hour of the observation are not preserved in any of the extant manuscripts: as a consequence, here a *lacuna* is required (although not signalled in Heiberg's edition).

As can be seen, what most strikingly characterises Heliodorus' approach in these records is, on the one hand, his insistence on the data coming from observation, and, on the other hand, the comparison between those observations and the predictions achieved through calculations. Such calculations were carried out using various different tools: in one case (no. 7) Heliodorus refers to ἐφημερίδες, a genre of astronomical tables quite widespread in the Roman imperial and late antique periods, of which a good number of papyrus fragments is preserved[20]; but in the other one (no. 6) he explicitly states that the predictions came from calculations made on the basis of Ptolemy's works, the Κανών (i.e. the *Handy Tables*) and the Σύνταξις (i.e. the *Almagest*). The result of these comparisons was that those predictions were simply wrong: and it is evocative to imagine how many times Heliodorus must have repeated his calculations, trying to find some procedural errors of his own, before resigning himself to the fact that it was the Ptolemaic data themselves which were inaccurate. And it was not a small error: the exact dates of observation no. 7 are not preserved, but no. 6 records a planetary conjunction between Mars and Jupiter taking place four days before the date predicted on the basis of the Ptolemaic data.

Heliodorus' text provides undeniable evidence that late antique astronomers in Alexandria, at least since the beginning of the sixth century, were well aware of certain shortcomings of the Ptolemaic data: they observed the sky, and through such observations they realised that the calculations based on Ptolemy's works were not (or no longer) coherent with the reality of the phenomena. Now, we may ask ourselves whether this awareness prompted a revision of Ptolemy's data, with the aim of correcting such errors, or rather we should imagine that the late antique astronomers acknowledged these inconsistencies, but did not engage actively in their correction. An error of four days in the calculation of the date of a planetary conjunction could not simply be passed under silence: it would indeed destroy every hope of accuracy for the main practical application of astronomical science in antiquity, namely the production of horoscopes. If only for this reason, we can reasonably suppose that, once the existence of such errors was acknowledged, some attempts were made to correct them: but, of course, Neugebauer was probably right in stating that «it does not seem very likely … that this [i.e. Heliodorus' record of observations] reveals a program to check and correct existing tables; a few data scattered over several decades would not suffice for such a task»[21]. It must be said, however, that Heliodorus' notes seem to be something more than «a few data scattered over several decades»: if we examine the dates more carefully, we

[20] Jones 1999, vol. 1, pp. 40-42.
[21] Neugebauer 1975, p. 1038.

find that the records start with the recovery of an observation made one generation earlier by Proclus; then, after two instances dating to the turn of the century (AD 498 and 502, the second one performed together with Ammonius), the frequency of entries suddenly intensifies, with no less than four observations concentrated within a few months in AD 508-509. One has the feeling the Heliodorus was actually trying to understand more of the problem in the only possible way, namely by carrying out a more systematic observation campaign.

In the end however, as Neugebauer rightly recognised, no coherent programme to check and correct all the values found in the existing astronomical tables was carried out. We do not know why this was the case: perhaps Heliodorus was not able to solve the numerous questions opened by his discovery, or perhaps he was not willing to venture too far in questioning Ptolemy's authority. But, even in the absence of a systematic campaign of corrections, some updatings of individual values in the Ptolemaic astronomical tables were made, and have left traces in the extant sources. In their recent edition of the first two of Ptolemy's *Handy Tables*, Anne Tihon and Raymond Mercier were able to find unmistakable traces of a late antique revision in the table of oblique ascension[22]. This table contains the values for the ascension of the different degrees of the ecliptic, as observed from different geographical latitudes; it is attested both in papyrus fragments (*P.Oxy.* 4167 and 4171, dated to the late third or early fourth century[23]) and in middle- to late Byzantine manuscript tradition: but, while all the values attested in the papyri are in accordance with those found in the table of oblique ascension in *Almagest* 2.8 (although the latter is not as detailed as the one in the *Handy Tables*), some of the values attested in the Byzantine manuscript tradition vary slightly (between 1' and 4') from those found in the *Almagest* and in the papyrus fragments. As Tihon and Mercier rightly pointed out, this discrepancy cannot be interpreted as just an accident of transmission, because the four oldest manuscripts of the *Handy Tables*, from which the later tradition derives, are totally consistent with one another: in other words, their archetype already featured these values.

I will return later on the possible date and provenance of the archetype of at least part of the extant tradition of the *Handy Tables*. For now, I would like to reaffirm the conclusions of Tihon and Mercier: the values found in the table of oblique ascension, as attested in the Byzantine manuscript tradition, are (at least partially) not in accordance with those found in papyrus fragments of the same table dating to the third and fourth century. The papyrus tables agree with

[22] Tihon, Mercier 2011, vol. b, pp. 133-138.
[23] Jones 1999, vol. 1, pp. 160-162 and 165; vol. 2, pp. 118-129 and 148-149.

the values presented in the *Almagest*, while their Byzantine versions have different values, which are generally less correct, but coherent within themselves. They are concentrated in a precise area of the sky, namely the four signs around the autumn equinox (Leo, Virgo, Libra, Scorpius); moreover, they follow a coherent arithmetical pattern which cannot be explained as the consequence of a casual concentration of scribal errors. Rather, it appears that, at some point between the fourth and the ninth century, a reviewer of the *Handy Tables* consciously chose to insert some values not in accordance with those found in the *Almagest* and attested in the earlier tradition of the *Handy Tables* themselves. These new values must be the result of a purposeful revision of the transmitted data, made on the basis of specific criteria, with the assumption (although wrong) that these new values would have been more correct than the older ones. I leave to scholars more expert in astronomical matters the reconstruction of these criteria: in the following pages, I will approach the problem from a strictly philological point of view, trying to assess whether it is possible to establish the date and context of such a revision.

On the one hand, we have seen that the *Handy Tables* papyrus fragments from the third and fourth century still have data coherent with those in the *Almagest* and not with those found in the later Byzantine tradition of the *Handy Tables* themselves. This fact agrees with the testimony of Theon of Alexandria, who, in his commentaries to the *Almagest* and the *Handy Tables* (written in the second half of the fourth century), in various instances explicitly highlights the συμφωνία, that is, the coherence between the data found in the two works, in particular regarding the calculations of the movement of the Sun and the prediction of eclipses[24]: according to Theon, the difference between the two Ptolemaic works concerns the organization of the material and the quantity and depth of theoretical explanations provided to the readers, but not the numerical data themselves. Indeed, Heliodorus himself explicitly remarked that «the calculations made on the basis of the *Tables* and the *Almagest*» were not correct with respect to his own observations: from this choice of words, it seems reasonable to assume that the calculations made on the basis of the two Ptolemaic works were actually giving the same (wrong) result; if a difference had existed between the two, Heliodorus would probably have mentioned it. On the other hand, Leontius, writing in the mid-sixth century, says that the celestial spheres available in his time are «not in accordance with Ptolemy in some details, as it is reasonable»: thus, the hypothesis can be raised that sometime between Heliodorus and Leontius, i.e. in the first half of the sixth century, some attempts towards

[24] See for example the chapter of his *Commentary to Ptolemy's Almagest* quoted above, note 3.

a partial and non-systematic revision of the *Handy Tables* were made in Alexandria, of which Leontius acknowledges the effects on the field of celestial cartography.

To test this hypothesis, we can look at the Byzantine tradition of the *Handy Tables*, in order to identify, if possible, where and when that tradition started. The earliest Byzantine witnesses of the *Handy Tables* are four manuscripts produced in the ninth and tenth century: Città del Vaticano, Biblioteca Apostolica Vaticana, ms. Vat. gr. 1291 (**V**); Firenze, Biblioteca Medicea Laurenziana, ms. Plut. 28.26 (**F**); Leiden, Universiteitsbibliotheek, ms. BPG 78 (**H**); Venezia, Biblioteca Nazionale Marciana, ms. Gr. Z. 331 (=552) (**M**)[25]. Concerning a possible reconstruction of their models, the most interesting is surely the Vat. gr. 1291, a lavishly illustrated manuscript produced probably in Costantinople at the beginning of the ninth century[26]. As often happens with luxury scientific books, the Vat. gr. 1291 is quite clearly inspired by the model of a late antique manuscript, for what concerns its script, its *mise en page*, as well as the iconography and style of its illustrations: even if its materials do not necessarily all come from the same source, they have been integrated into a stylistically coherent object. Nonetheless, thanks to the exceptional quality of the scribal work, it is possible to suggest with a reasonable degree of plausibility a date and place of production for what was probably the main model used for the production of this manuscript. Two important clues are found in the chronological table of rulers (table C1, in Tihon's classification), on ff. 16v-17r. The first is the mention of Alexander the Great, who appears twice (in the heading of the table, and at the end of the first column of f. 16v) as Ἀλέξανδρος ὁ κτίστης, 'Alexander the founder'. Such an epithet, admittedly, does not make much sense for a scribe and a reader active in Constantinople: it is safe to assume that this formulation was simply copied by the scribe from the antigraph of the extant manuscript. Consequently, there is a good chance that the latter had been produced in Alexandria, a city which preserved and honoured the memory of its glorious founder well into late antiquity. The second clue is found in the first column of f. 17r, where, between the entries devoted to the emperors Justin (*reg.* AD 518-527) and Justinian (*reg.* AD 527-565), the scribe specifies: «Ἰουστῖνος ἔτι κ(αὶ) Ἰουστινιανὸς μῆνας $\bar{\delta}$» («Justin again, together with Justinian, four months»). For the requirements of the chronological table, counting the years of reign of every Babylonian, Persian

[25] A detailed analysis of these four manuscripts is provided by Tihon 1992.

[26] For a description of the manuscript see at least Boll 1899, pp. 110-138; Tihon 1992, pp. 61-64; Tihon, Mercier 2011, vol. a, pp. 34-39. The production of the manuscript has been dated by Janz 2003, with compelling arguments, to the reign of Leo V (813-820 AD). Especially on its illustrations cfr. Weitzmann 1935, pp. 1-2; Spatharakis 1978, in part. pp. 47-49; Tihon 1993, pp. 194-200; Dekker 2013, pp. 225-227, cat. n. H11; Guidetti 2013, pp. 132-133; Lazaris 2017, pp. 65-67. The manuscript is digitised with high-quality scans on the website of the Biblioteca Apostolica Vaticana: <http://digi.vatlib.it/view/MSS_Vat.gr.1291> (accessed: December 2018).

and Egyptian king, and then of every Roman emperor, from the eighth century BC up to the present times, there was absolutely no reason to point out that Justin and Justinian reigned together for four months in AD 527, since this short period of joint rule did not have any consequence on the counting of the regnal years. This specification actually makes sense only for a scribe and a reader active under Justinian himself, when the memory of his joint reign with his uncle was still fresh, and when it could be deemed appropriate to praise the ruling emperor by explicitly remembering the legitimacy of his succession and the esteem showed to him by his late predecessor.

A date in the Justinianic period for this more or less direct ancestor of the Vat. gr. 1291 is further confirmed by a text written on f. 47r, explaining the method of calculating the epacts, i.e. the number of days by which the solar and lunar cycles are shifted in a given year. The circular table of the epacts (κανόνιον ἐπακτῶν) in the centre of the page contains values for the years 30 to 257 of the Era of Diocletian (AD 313/314 to 540/541), thus leaving an interval of more than two centuries for the production of the original table; the six lines of text above it, however, explain the procedure to calculate the epacts by means of an example dated to the year 239 of Diocletian, i.e. AD 522/523[27]. The prominence given to this text by the ninth-century scribe, who copied it as a sort of introduction to the table itself, makes it difficult to suppose that in his model this was simply a marginal note added by a later hand. Probably this text had been an integral part of the original codex from its very beginning, that is to say, it had been included among the materials that were given to the Alexandrian librarian who produced the luxury sixth-century model: this possibility is further strengthened by the fact that the date of the example falls well within the interval covered by the table, and can therefore be considered contemporary to its creation. If this hypothesis is true, then the year 239 of Diocletian, mentioned in the procedural example, can be interpreted as the date of the latest revision of the following table of the epacts; as a consequence, the ancestor of the Vat. gr. 1291 would have been produced shortly after AD 522/523, i.e. precisely at the beginning of Justinian's reign.

[27] The *scholion*, not quite understood by the ninth-century scribe, reads as following: «Τὰ ἀπὸ Διοκλητιανοῦ ἔτη κατέχων ἐν τῇ χειρί σου, ἀφαίρεσον ἐξ αὐτῶν ἓν· τὰ λοιπὰ μέρισον παρὰ τὸν δεκαεννέα· καὶ τὰ λοιπὰ πολυπλασίασον ἐπὶ τὸν ῑα̅ (ms.: ῑθ̅)· καὶ ῥῖψον τριακοντάδας· καὶ τὰ καταλειπόμενα λέγε ἐπακτὰς εἶναι. Ὑποδείγματος χάριν, ἔστω ἔτη σλθ̅, ἀφ᾽ ὧν α̅, λοιπὰ σλη̅· παρὰ τὸν ῑθ̅, δέκα δεκαεννέα, δὶς δεκαεννέα, λοιπὰ ῑ· ταῦτα ἐπὶ τὸν ἕνδεκα γίνεται [δέκα δεκαεννέα] ρ̄ῑ· ῥίπτομεν τρὶς τριάκοντα, λοιπαὶ κ̄[ατὰ]· ταύτας λέγομεν ἐπακτὰς» («Having in your hand the number of years according to the Era of Diocletian, subtract one from them; divide what remains by nineteen, and multiply the remainder by 11; discard the multiples of thirty, and what remains you can tell that they are the epacts. For example: let the year be 239, minus 1 equals 238; divided by 19, equals ten times nineteen and two times nineteen, the remainder is 10; this multiplied by eleven equals 110; we discard three times thirty, what remains is 20: these we call the epacts»).

In the absence of a reliable complete edition of the *Handy Tables*, it is impossible to establish whether this lost sixth-century codex has to be regarded just as a more or less direct ancestor of the Vat. gr. 1291, or can be credited a more important place within the overall tradition of this Ptolemaic work. However, I believe that the considerations I proposed can help us narrow the time interval during which the late antique partial and non-systematic revision of Ptolemy's *Handy Tables* could have been made. As we have seen, Heliodorus, observing the sky from Alexandria in AD 508-509, noticed that his observational data were not in agreement with the calculations based on the Ptolemaic tables. As Neugebauer points out, the observational records copied from Heliodorus' notes are indeed quite precise and substantially agree with modern computations reconstructing the positions of the planets in the dates indicated by the Alexandrian astronomer[28]. This is in stark contrast to another remark by Neugebauer, namely that Heliodorus' «complaint against the tables cannot be based on very accurate computations»[29]: however, it seems to me very difficult to believe that Heliodorus did not check his results many times before resigning himself to openly question Ptolemy's authority. If Neugebauer's computations based on Ptolemy's *Handy Tables* did not agree with Heliodorus', the reason may be not that Heliodorus' computations were inaccurate, but rather that Heliodorus and Neugebauer had two different versions of the same Ptolemaic work: in other words, Neugebauer based his calculations on the Byzantine version of the *Handy Tables*, which had been revised and updated after (and, probably, in consequence of) Heliodorus' discovery of the inaccuracy of their previous version. On the other hand, if we accept the hypothesis that the codex from which the Vat. gr. 1291 at least partially derives was written in Alexandria in the second quarter of the sixth century, then this lost manuscript can be regarded as the first retraceable attestation of the revised version of Ptolemy's *Handy Tables*, providing a *terminus ante quem* for the production of the new version itself.

At this point, if this reconstruction is true, we can draw some consequences about the chronology and procedure of this first attempt to update Ptolemy's astronomical tables in late antique Alexandria. The fact that the revised version of the tables was already used in the second quarter of the sixth century for the ancestor of the Vat. gr. 1291 leads one to think that the updating must have started immediately after Heliodorus' observations in AD 508-509. This means that Heliodorus' observational records did not enter the tradition of Ptolemy's astronomical works merely by chance: Heliodorus' successors may have decided to preserve them precisely because

[28] Neugebauer 1975, pp. 1039-1041.
[29] Neugebauer 1975, p. 1040.

these were the observations which had prompted the first critical revision of the Ptolemaic data. The updating work was probably carried out by Heliodorus himself, perhaps together with his brother Ammonius, and concerned primarily the *Handy Tables* and not the *Almagest*. This choice can be explained by taking into account the different readers and contexts of use of the two main Ptolemaic works in late antiquity: the *Tables* were commonly used as a practical tool for astronomical computations (especially for astrological purposes), and for this reason needed to be updated in the most accurate way; on the contrary, the *Almagest*, as a theoretical work, was used primarily for the advanced teaching of astronomy: and we can suppose that its readers, being already highly specialised, were able to draw a clear line between Ptolemy's theoretical models and the individual data, whose occasional numerical inaccuracies were of course not sufficient to invalidate the model itself.

It is important to note, however, that the production of a revised version did not immediately decree the oblivion of the previous one: in the seventh century they were both available and in use. At the beginning of that century, Stephanus of Alexandria prepared his own astronomical tables for the latitude of Constantinople on the basis of the unrevised version of Ptolemy's *Handy Tables*[30]; a few decades later, the Syriac astronomer Severus of Nisibis was using the revised version for his calculations[31]. Severus' use of the revised version, in turn, can strengthen our hypothesis on the date and context of the revision: as Émilie Villey has shown, Severus had access to Alexandrian materials related to Ammonius' teaching of astronomy, and probably translated into Syriac Ammonius' treatise on the astrolabe, whose Greek original is now lost[32]; it cannot even be excluded that the observations which prompted the revision and updating of the Ptolemaic data were fostered also by the development of such new astronomical instruments. If in the seventh century both versions of the *Tables* were available, it is certainly significant that it was the unrevised version, not the revised one, which was used to produce new tables for the latitude of Constantinople: this may raise the question of why only the revised version has been handed down to us by the middle Byzantine tradition. I think that the fact of having been transmitted by such a lavish late antique manuscript as the Alexandrian codex which provided the model for the Vat. gr. 1291 was in itself sufficient to give this version an exceptional authority to the eyes of later scholars, in a way comparable to what happened to the Greek and Latin Aratean manuscripts in the Carolingian West. In this way, the Byzantine tradition of Ptolemy's *Handy Tables* became a sort of hybrid, in which the

[30] As shown by Tihon, Mercier 2011, vol. b, pp. 143-145.
[31] Tihon, Mercier 2011, vol. b, pp. 186-189.
[32] Villey 2015.

sixth-century revised Alexandrian version was handed down together with Stephanus' new tables for Constantinople, which were based on the older, unrevised Ptolemaic version.

As a conclusion, I would like to suggest a way to contextualise this first, partial and non-systematic attempt towards a revision of Ptolemy's tables into the broader history of the development of late antique astronomy. Acknowledging that already in the sixth century the Alexandrian astronomers had recognised that the Ptolemaic data were no longer accurate may allow us to put into a better historical perspective al-Maʾmūn's attempt of a more thorough revision of the ancient astronomical data. The Arab and Persian astronomers, in my opinion, did not suddenly and unexpectedly come up with the idea of checking the transmitted data, as if for some reason they were not willing to trust Ptolemy's authority: rather, after the conquest of Syria and Egypt they came into contact with a late antique Greco-Roman tradition which had already recognised the need for a revision and updating of such data. The late antique Alexandrian astronomers were probably aware that in the long run, after more than three centuries after Ptolemy's observations, the accumulation of approximations and small inaccuracies had outdated the data found in his tables, and that these required regular revisions. After another three hundred years, the *Mumtaḥan* astronomers, better equipped than their Alexandrian predecessors thanks to the larger resources provided by the Caliph, and perhaps also less reluctant to openly question Ptolemy's authority, succeeded where their late antique colleagues had failed: they produced new astronomical tables that can be considered, at least in some respects, more accurate than the Ptolemaic ones, and could be further improved by later astronomers. But such a complex operation would have been much more difficult to envisage if the late antique Alexandrian astronomers had not already pointed out the need for a revision of the transmitted data. In conclusion, what results from this study is a picture of continuity of scientific development from the Greco-Roman into the Islamic world, which can help better understand the role of the Alexandrian school of late antiquity in the transmission of ancient science into the Middle Ages.

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Appendix: Ptolemy's *Table of the Distances of the Fixed Stars*

Here follows a preliminary edition of table A20 (*Distances of the Fixed Stars Up to a Latitude of 10° and Fourth Magnitude*) of Ptolemy's *Handy Tables*. It must be clear that this is not a proper critical edition: such a task would require a close examination of all the extant manuscripts and the elaboration of a *stemma codicum* of their tradition, a goal which could be achieved only in the context of a comprehensive study of the *Handy Tables* as a whole. This working edition, on the contrary, is based only on the four most ancient extant manuscripts, dating from the ninth and tenth century and ultimately derived from late antique copies of Ptolemy's text.

When I started working on A20, my goal was to test the existence of divergences between this table and the star catalogue included in books 7 and 8 of the *Almagest*, in the hope that these divergences could provide some clues regarding a possible late antique revision of the table itself. The edition actually highlighted a considerable number of differences, which will be commented upon at the end; however, given the absence of any evidence prior to the Byzantine period (such as, for example, the papyrus fragments available for tables A1 and A2), it has been impossible to establish whether such differences are to be interpreted as traces of a revision, or rather as authorial variants by Ptolemy himself. Even if the comparison with the astronomical data of the *Almagest* (which is carried out in full in an additional table) did not prove useful for the main argument of this paper, I nonetheless decided to publish this *editio princeps*: although partial, it will provide scholars with the first critical text of this fundamental work, which will hopefully be used as a basis for future studies, corrections and improvements.

SIGLA:

F = Firenze, Biblioteca Medicea Laurenziana, ms. Plut. 28.26, ff. 124v-127r
H = Leiden, Universiteitsbibliotheek, ms. BPG 78, ff. 142r-145r
M = Venezia, Biblioteca Nazionale Marciana, ms. Gr. Z. 331 (=552), ff. 21v-22v + 48r-49v
V = Città del Vaticano, Biblioteca Apostolica Vaticana, ms. Vat. gr. 1291, ff. 90v-94v

ΕΠΟΧΑΙ ΑΠΛΑΝΩΝ ΑΣΤΕΡΩΝ ΜΕΧΡΙ ΔΕΚΑΜΟΙΡΟΥ ΠΛΑΤΟΥΣ ΚΑΙ ΜΕΓΕΘΟΥΣ ΤΕΤΑΡΤΟΥ

			μῆκος		πλάτος			μέγεθος
1	Λέοντος	ὁ ἐπὶ τῆς καρδίας τοῦ Λέοντος	ø	ø	βο.	ø	ῑ	α΄
2		ὁ ἐπὶ τοῦ ἡγουμένου γόνατος τοῦ Λέοντος	ø	ø	νο.	δ̄	ιε̄	δ΄
3		ὁ νοτιώτερος τοῦ ἐπὶ τῆς καρδίας τοῦ Λέοντος καὶ <ὡς ἐπὶ> τοῦ στήθους	α̅	ø	νο.	α̅	ν̄	δ΄

4		ὁ ἐπὶ τῆς μασχάλης τοῦ Λέοντος, ὃν Ἵππαρχος καλεῖ ἐπὶ τῆς γαστρὸς τοῦ Λέοντος	ϛ	μ	νο.	ø	ι	δ΄
5		ὁ ἐπὶ τοῦ γλουτοῦ τοῦ Λέοντος λαμπρός	ιγ	ν	βο.	θ	κ	γ΄
6		ὁ προηγούμενος τῶν ὀπισθίων μηρῶν τοῦ Λέοντος	ιε	ø	βο.	α	ι	δ΄ ἐλ.
7		ὁ ἐπὶ τῶν ὀπισθίων μηρῶν τοῦ Λέοντος	ιζ	ν	βο.	ε	ν	γ΄
8		ὁ κατὰ τῶν ἑπομένων γονάτων τοῦ Λέοντος	ιθ	ι	βο.	α	ιε	δ΄
9		ὁ ἐπὶ τῆς κνήμης τοῦ Λέοντος, ὃν Ἵππαρχος καλεῖ ὀπίσθιον πόδα	κβ	ι	νο.	ø	ν	δ΄
10	Παρθένου	ὁ ἐπ᾽ ἄκρας τῆς νοτίου πτέρυγος τῆς Παρθένου	κϛ	λ	βο.	ø	ι	γ΄
11		ὁ ἑπόμενος αὐτοῦ καὶ νοτίου πτέρυγος δεύτερος	λε	με	βο.	α	ι	γ΄
12		ὁ ἔτι τούτῳ ἑπόμενος, ὃν Ἵππαρχος καλεῖ νότιον ὦμον	μ	μ	βο.	β	ν	γ΄
13		ὁ ἐν τῷ βορείῳ πλευρῷ, ὃν Ἵππαρχος καλεῖ βόρειον ὦμον	μα	ν	βο.	η	ιε	γ΄
14		ὁ ἑπόμενος καὶ τέταρτος τῶν ἀπὸ τοῦ ἐπ᾽ ἄκρας τῆς νοτίου πτέρυγος τῆς Παρθένου	μη	λ	βο.	α	λ	δ΄
15		ὁ ἐπὶ τοῦ βορείου γλουτοῦ, ὃν Ἵππαρχος καλεῖ δεξιὸν ἀκρόχειρον	νβ	κ	βο.	η	μ	γ΄
16		ὁ ἐπὶ τοῦ Στάχυος τῆς Παρθένου λαμπρός	νδ	ι	νο.	β	ø	α΄
17		τοῦ βορειοτέρου <τοῦ> Στάχυος τετραπλεύρου ὁ ἑπόμενος	νζ	λ	βο.	α	λ	δ΄
18		τῶν ἐν τῷ σύρματι τῆς Παρθένου τριῶν ὁ μέσος	ξδ	ι	βο.	ζ	λ	δ΄
19		ὁ νοτιώτερος τῶν ἐν τῷ σύρματι τριῶν	ξδ	ν	βο.	β	μ	δ΄
20		ὁ ἐπὶ τοῦ νοτίου ποδὸς τῆς Παρθένου	ξζ	κ	βο.	ø	λ	δ΄
21		ὁ ἐπὶ τοῦ βορείου ποδὸς τῆς Παρθένου	ο	ι	βο.	θ	ν	δ΄
22	Ζυγοῦ	ὁ ἐπ᾽ ἄκρας τῆς νοτίου Χηλῆς τοῦ Σκορπίου λαμπρός	οε	λ	βο.	ø	μ	β΄
23		ὁ ἑπόμενος αὐτῷ καὶ ἐπὶ τῆς αὐτῆς Χηλῆς	οη	ν	βο.	α	ιε	δ΄
24		ὁ ἐπ᾽ ἄκρας τῆς βορείου Χηλῆς τοῦ Σκορπίου λαμπρός	οθ	μ	βο.	η	ν	β΄
25		ὁ ἀπὸ μεσημβρίας τῶν Χηλῶν ἐκφανής	π	λ	νο.	ζ	λ	γ΄
26		ὁ ἐν μέσῃ τῇ νοτίῳ Χηλῇ τοῦ Σκορπίου	πα	λ	νο.	α	μ	δ΄
27		ὁ ἐν μέσῃ τῇ βορείῳ Χηλῇ τοῦ Σκορπίου	πε	κ	βο.	δ	με	δ΄
28		ὁ μεταξὺ τῶν Χηλῶν τοῦ Σκορπίου	πη	μ	νο.	α	λ	δ΄
29		τῶν ἑπομένων δύο τῆς νοτίου Χηλῆς ἐκφανῶν ὁ βορειότερος	πη	μ	νο.	η	ι	δ΄ ἐλ.
30		ὁ νοτιώτερος αὐτῶν	πθ	λ	νο.	θ	μ	δ΄ ἐλ.
31		ὁ ἐπὶ τῆς ἐκφύσεως τῆς βορείου Χηλῆς τοῦ Σκορπίου	ϙ	λ	βο.	γ	λ	δ΄ ἐλ.
32		ὁ βορειότερος αὐτοῦ	ϙ	μ	βο.	ϛ	μ	δ΄ ἐλ.
33		τῶν ἀπ᾽ ἄρκτου τῆς βορείου Χηλῆς τοῦ Σκορπίου ὁ βορειότατος	ϙα	ν	βο.	θ	ιε	δ΄ ἐλ.
34	Σκορπίου	τῶν ἐν τῷ μετώπῳ τοῦ Σκορπίου ὁ δεύτερος ἀπὸ τοῦ βορειοτάτου	ϙγ	ι	νο.	α	μ	γ΄

35		ὁ τρίτος ἀπὸ τοῦ βορειοτάτου τῶν ἐν τῷ μετώπῳ τοῦ Σκορπίου	ϙγ	ι	νο.	ε	ø	γ΄
36		ὁ ἔτι νοτιώτερος καὶ τέταρτος ἀπὸ τοῦ βορειοτάτου	ϙγ	λ	νο.	ζ	ν	γ΄
37		ὁ βορειότατος τῶν ἐν τῷ μετόπῳ τοῦ Σκορπίου	ϙγ	ν	βο.	α	κ	γ΄
38		τῶν παρακειμένων δύο τῷ βορειοτάτῳ ὁ νοτιώτερος	ϙγ	ν	βο.	ø	λ	δ΄
39		ὁ βορειότερος αὐτῶν	ϙδ	λ	βο.	α	μ	δ΄
40		ὁ ἐπὶ τοῦ ἡγουμένου ποδὸς τοῦ Ὀφιούχου	ϙη	ι	νο.	ø	με	δ΄
41		τῶν ἐν τῷ στήθει τοῦ Σκορπίου τριῶν λαμπρῶν ὁ ἡγούμενος	ϙη	ι	νο.	γ	με	γ΄
42		ὁ μέσος αὐτῶν ὑπόκιρρος, καλούμενος Ἀντάρης	ρ	ι	νο.	δ	ø	β΄
43		ὁ ἑπόμενος τῶν τριῶν τῶν ἐν τῷ στήθει τοῦ Σκορπίου	ρβ	ø	νο.	ε	λ	γ΄
44		ὁ ἐπὶ τοῦ ἑπομένου γόνατος τοῦ Ὀφιούχου	ρη	μ	βο.	ζ	λ	γ΄
45		τῶν ἐν τῷ ἑπομένῳ ποδὶ τοῦ Ὀφιούχου τριῶν ὁ προηγούμενος	ρι	λ	νο.	β	ιε	δ΄
46		ὁ ἐπὶ τῆς ἑπομένης γαστροκνημίας τοῦ Ὀφιούχου	ρια	ι	βο.	β	ιε	δ΄ με.
47		τῶν ἐν τῷ ἑπομένῳ ποδὶ τοῦ Ὀφιούχου ὁ δεύτερος ἀπὸ τοῦ ἡγουμένου	ρια	ν	νο.	α	λ	δ΄ με.
48		ὁ τούτῳ ἑπόμενος καὶ τρίτος ἀπὸ τοῦ ἡγουμένου	ριβ	λ	νο.	ø	κ	δ΄ με.
49		τῶν ἀπ᾽ ἄρκτου δύο τοῦ κέντρου τοῦ Σκορπίου ὁ ἡγούμενος	ριγ	ø	νο.	ς	ι	δ΄ με.
50	Τοξότου	ὁ ἐπὶ τῆς ἀκίδος τοῦ βέλους τοῦ Τοξότου	ρκβ	ø	νο.	ς	κ	γ΄
51		τῶν ἐν τῷ τόξῳ τοῦ Τοξότου ὁ βορειότατος καὶ ἐπ᾽ ἄκρου τοῦ τόξου	ρκδ	ι	βο.	β	ν	δ΄
52		ὁ τρίτος ἀπὸ τοῦ βορειοτάτου καὶ κατὰ τῆς λαβῆς τοῦ Τοξότου	ρκε	ι	νο.	ς	λ	γ΄
53		ὁ δεύτερος ἀπὸ τοῦ βορειοτάτου τῶν ἐν τῷ τόξῳ τοῦ Τοξότου	ρκς	λ	νο.	α	λ	γ΄
54		ὁ ἡγούμενος τῶν ἐν τῇ ὠμοπλάτῃ τοῦ Τοξότου, τοῦ τετραπλεύρου	ρλ	λ	νο.	γ	με	δ΄ με.
55		ὁ κατὰ τοῦ ὀφθαλμοῦ τοῦ Τοξότου νεφελοειδής	ρλβ	μ	βο.	ø	με	νεφ.
56		τοῦ τετραπλεύρου τῶν δύο λαμπρῶν ἀντιγωνίων ὁ βορειότερος	ρλβ	ν	νο.	γ	ι	γ΄
57		ὁ τούτου βορειότερος καὶ κατὰ τῆς κεφαλῆς τοῦ Τοξότου	ρλγ	ι	βο.	β	ι	δ΄
58		τῶν εἰρημένων δύο λαμπρῶν ἀντιγωνίων ὁ νοτιώτερος	ρλγ	ν	νο.	ς	με	γ΄
59		ὁ λοιπὸς καὶ ἑπόμενος τοῦ τετραπλεύρου	ρλε	ι	νο.	δ	λ	δ΄
60		ὁ μέσος τῶν ἐν τῇ κεφαλῇ τοῦ Τοξότου τριῶν	ρλε	ι	βο.	α	λ	δ΄
61		ὁ ἑπόμενος τῶν τριῶν	ρλς	μ	βο.	β	ø	δ΄
62		τῶν ἐν ταῖς ἐφαπτίσι τοῦ Τοξότου δύο ἐκφανῶν ὁ νοτιώτερος	ρλθ	ν	βο.	δ	λ	δ΄
63		ὁ βορειότερος αὐτῶν	ρμ	κ	βο.	ς	λ	δ΄
64		ὁ ἐπὶ τοῦ ἑπομένου ἀγκῶνος τοῦ Τοξότου	ρμβ	κ	νο.	β	ν	δ΄
65	Αἰγόκερω	τῶν ἐν τοῖς κέρασι τοῦ Αἰγόκερω δύο λαμπρῶν ὁ νοτιώτερος	ρνδ	ν	βο.	ε	ø	γ΄

66		ὁ βορειότερος αὐτῶν	ρνδ	ν	βο.	ζ	κ	γ΄
67		ὁ ἐπὶ τοῦ βορείου γόνατος τοῦ Αἰγόκερω	ρνη	κ	νο.	ς	λ	δ΄
68		ὁ ἐπὶ τοῦ νοτίου γόνατος τοῦ Αἰγόκερω	ρνθ	ι	νο.	η	λ	δ΄
69		τῶν ἐν τῷ ἱματίῳ τοῦ Ὑδροχόου τριῶν ὁ βορειότατος	ρξβ	ι	βο.	η	μ	γ΄
70		ὁ μέσος τῶν τριῶν	ρξγ	μ	βο.	η	ø	δ΄
71		ὁ κατὰ τῆς ὠμοπλάτης τοῦ Αἰγόκερω	ρξδ	ι	νο.	ζ	μ	δ΄
72		τῶν ἐν τῷ νώτῳ τοῦ Αἰγόκερω δύο ὁ προηγούμενος	ρξδ	ι	νο.	ø	ø	δ΄
73		τῶν ἐν τῷ ἱματίῳ τοῦ Ὑδροχόου τριῶν ὁ νοτιώτατος	ρξε	ι	βο.	ε	λ	γ΄
74		τῶν ὑπὸ τὴν κοιλίαν τοῦ Αἰγόκερω δύο συνεχῶν ὁ προηγούμενος	ρξζ	μ	νο.	ς	ν	δ΄
75		τῶν ἐν τῷ νώτῳ τοῦ Αἰγόκερω δύο ὁ ἑπόμενος	ρξη	κ	νο.	ø	ν	δ΄
76		τῶν ἐν τῇ νοτίῳ ἀκάνθῃ δύο ὁ προηγούμενος	ρο	ν	νο.	δ	με	δ΄
77		τῶν ἐν τῷ παρούρῳ τοῦ Αἰγόκερω δύο λαμπρῶν ὁ προηγούμενος	ροβ	κ	νο.	β	ι	γ΄
78		τῶν ἐν τῇ νοτίῳ ἀκάνθῃ δύο ὁ ἑπόμενος	ροβ	λ	νο.	δ	λ	δ΄
79		ὁ ἑπόμενος τῶν ἐν τῷ παρούρῳ δύο λαμπρῶν	ρογ	ν	νο.	β	ø	γ΄
80	Ὑδροχόου	ὁ ἐν τῷ ἡγουμένῳ ὤμῳ τοῦ Ὑδροχόου	ροδ	ø	βο.	η	ν	γ΄
81		τῶν ἐν τῇ οὐρᾷ τοῦ Αἰγόκερω ὁ ἐκφανής	ροδ	κ	βο.	ø	κ	δ΄
82		ὁ ἐν τῷ προηγουμένῳ γλουτῷ τοῦ Ὑδροχόου, ὃν Ἵππαρχος καλεῖ ἀριστερὸν βουβῶνα	ροθ	ι	νο.	α	μ	δ΄
83		τῶν ἐπὶ τῆς ἐπομένης κοτύλης τοῦ Ὑδροχόου δύο ὁ λαμπρός	ρπγ	μ	βο.	γ	ø	δ΄
84		ὁ ἐπὶ τοῦ ἑπομένου μηροῦ τοῦ Ὑδροχόου, ὃν Ἵππαρχος καλεῖ δεξιὸν βουβῶνα	ρπς	ι	νο.	ø	ν	δ΄
85		ὁ ἐν τῷ ἑπομένῳ πήχει τοῦ Ὑδροχόου καὶ ἡγούμενος τῆς κάλπιδος	ρπζ	ø	βο.	η	με	γ΄
86		τῶν ἐν τῇ ἑπομένῃ κνήμῃ τοῦ Ὑδροχόου δύο ὁ βορειότερος	ρπη	ν	νο.	ε	ø	δ΄
87		ὁ νοτιώτερος τῶν δύο τῶν εἰρημένων	ρπθ	ι	νο.	ζ	λ	γ΄
88		τῶν ἐν τῇ κάλπιδι νοτίων δύο καὶ ἑπομένων ὁ ἡγούμενος	ρπθ	λ	βο.	θ	ø	γ΄
89		ὁ ἑπόμενος τῶν δύο τῶν εἰρημένων	ρϙ	ν	βο.	η	λ	γ΄
90		τῶν ἐν τῷ Ὕδατι ἀπὸ τῆς κάλπιδος δύο ὁ νοτιώτερος	ρϙβ	κ	βο.	ø	ι	δ΄
91		ὁ βορειότερος τῶν δύο τῶν εἰρημένων	ρϙβ	λ	βο.	β	ø	δ΄
92		τῶν ἐφεξῆς τοῦ ἐν τῷ ὕδατι τετραπλεύρου ὁ ἡγούμενος	ρϙε	ι	νο.	α	ι	δ΄
93		ὁ νοτιώτερος τῶν ἐν τῷ τετραπλεύρῳ	ρϙς	λ	νο.	γ	λ	δ΄
94		ὁ τούτῳ συνεχὴς καὶ ἀπὸ μεσημβρίας αὐτοῦ	ρϙζ	κ	νο.	δ	ι	δ΄
95		τῶν λοιπῶν καὶ ἑπομένων δύο τοῦ τετραπλεύρου ὁ βορειότερος	ρϙζ	λ	νο.	ø	λ	δ΄

96		ὁ νοτιώτερος τῶν δύο τῶν εἰρημένων	ρϙη	ø	νο.	α	μ	δ΄
97	Ἰχθύων	ὁ ἐν τῷ στόματι τοῦ νοτίου Ἰχθύος	ρϙθ	ι	βο.	θ	ιε	δ΄
98		τῶν ἑπομένων αὐτῷ δύο καὶ ἐπὶ τοῦ κρανίου ὁ νοτιώτερος	σα	μ	βο.	ζ	λ	δ΄
99		ὁ βορειότερος τῶν δύο τῶν εἰρημένων	σγ	λ	βο.	θ	κ	δ΄
100		τῶν ἐν τῇ κοιλίᾳ τοῦ νοτίου Ἰχθύος δύο ὁ ἡγούμενος	σγ	λ	βο.	δ	λ	δ΄
101		τῶν ἐν τῷ νώτῳ τοῦ νοτίου Ἰχθύος δύο ὁ ἡγούμενος	σε	μ	βο.	θ	λ	δ΄
102		τῶν εἰρημένων ἐν τῇ κοιλίᾳ δύο ὁ ἑπόμενος	σζ	ι	βο.	γ	λ	δ΄
103		τοῦ ὑπὸ τὸν νότιον Ἰχθὺν τετραπλεύρου ὁ ἡγούμενος	ση	ι	νο.	ε	λ	δ΄
104		τῶν ἐν τῷ νώτῳ τοῦ νοτίου Ἰχθύος δύο ὁ ἑπόμενος	ση	ι	βο.	ζ	λ	δ΄
105		τῶν ἐν τῷ τετραπλεύρῳ δύο βορείων καὶ συνεχῶν ὁ ἡγούμενος	ση	μ	νο.	β	μ	δ΄
106		ὁ ἑπόμενος τῶν δύο τῶν συνεχῶν	σθ	με	νο.	β	λ	δ΄
107		ὁ λοιπὸς καὶ ἑπόμενος τοῦ ὑπὸ τὸν νότιον Ἰχθὺν τετραπλεύρου	σθ	ν	νο.	ε	λ	δ΄
108		ὁ ἐπ᾽ ἄκρου τοῦ βορείου οὐραίου τοῦ Κήτους	σιβ	ι	νο.	θ	μ	γ΄ ἐλ.
109		ὁ ἐπ᾽ ἄκρας τῆς οὐρᾶς τοῦ νοτίου Ἰχθύος	σιγ	λ	βο.	ς	κ	δ΄
110		τῶν ἐν τῷ λίνῳ τοῦ νοτίου Ἰχθύος ἐκφανῶν ὁ ἡγούμενος	σκδ	μ	βο.	β	ιε	δ΄
111		ὁ τούτῳ ἑπόμενος	σκη	ø	βο.	α	ι	δ΄
112		ὁ ἔτι τούτῳ ἑπόμενος καὶ τρίτος ἀπὸ τοῦ ἡγουμένου τῶν ἐκφανῶν	σλ	λ	νο.	ø	ι	δ΄
113		ὁ μετὰ τοῦτον καὶ τέταρτος ἀπὸ τοῦ ἡγουμένου τῶν ἐκφανῶν	σλγ	ν	νο.	β	κ	δ΄
114		ὁ ἔτι τούτῳ ἑπόμενος καὶ πέμπτος ἀπὸ τοῦ ἡγουμένου	σλς	ι	νο.	δ	μ	δ΄
115		τῶν ἐν τῷ λίνῳ τοῦ βορείου Ἰχθύος ὁ λαμπρὸς καὶ βορειότερος	σλζ	ν	βο.	ε	κ	γ΄
116		ὁ νοτιώτερος τῶν εἰρημένων ἐν τῷ λίνῳ τοῦ βορείου Ἰχθύος	σλη	ø	νο.	α	κ	δ΄
117		ὁ κοινὸς τοῦ λίνου καὶ τῆς οὐρᾶς τοῦ βορείου Ἰχθύος	σλη	ø	βο.	θ	ø	δ΄
118		ὁ προηγούμενος τοῦ ἐπὶ τοῦ συνδέσμου τῶν δύο λίνων	σλη	ι	νο.	ζ	με	δ΄
119		ὁ ἐπ᾽ αὐτοῦ τοῦ συνδέσμου τῶν δύο λίνων λαμπρός	σμ	ø	νο.	η	λ	γ΄
120	Κριοῦ	τῶν ἐν τῇ κεφαλῇ τοῦ Κριοῦ τριῶν ὁ ἡγούμενος	σμδ	ι	βο.	ζ	κ	γ΄
121		τοῦ ὑπὸ τὸν Κριὸν ῥομβοειδοῦς τετραπλεύρου ἐπὶ τῆς κεφαλῆς τοῦ Κήτους ὁ ἡγούμενος	σμε	ι	νο.	δ	ι	δ΄
122		ὁ μέσος τῶν τριῶν τῶν ἐν τῇ κεφαλῇ τοῦ Κριοῦ	σμε	ι	βο.	η	κ	γ΄
123		ὁ ἑπόμενος τῶν εἰρημένων τριῶν	σμη	ι	βο.	ι	ø	γ΄ με.
124		τοῦ εἰρημένου ῥομβοειδοῦς τετραπλεύρου ὁ μετὰ τὸν ἡγούμενον	σμη	ι	νο.	ε	μ	δ΄
125		ὁ τρίτος ἀπὸ τοῦ ἡγουμένου καὶ ἐπὶ τοῦ ὀπισθίου σκέλους τοῦ Κριοῦ	σνβ	κ	νο.	ε	ιε	δ΄ με.

126		ὁ ἑπόμενος τῶν ἐν τῷ ῥομβοειδεῖ τετραπλεύρῳ	σνε	ι	νο.	ζ	με	δ΄
127		τῶν ἐν τῇ οὐρᾷ τοῦ Κριοῦ τριῶν ὁ προηγούμενος	σξα	κ	βο.	α	μ	δ΄
128	Ταύρου	τῶν ἐν τῇ ἀποτομῇ τοῦ Ταύρου τεσσάρων ὁ νοτιώτατος	σξα	ν	νο.	θ	ιε	δ΄
129		τῶν εἰρημένων ὁ δεύτερος ἀπὸ τοῦ νοτιοτάτου	σξβ	ι	νο.	η	λ	δ΄
130		τῶν προειρημένων ἐν τῇ οὐρᾷ τοῦ Κριοῦ τριῶν ὁ μέσος	σξβ	ν	βο.	β	λ	δ΄
131		τῶν ἐν τῇ ἀποτομῇ τοῦ Ταύρου τεσσάρων ὁ δεύτερος ἀπὸ τοῦ βορειοτάτου	σξγ	λ	νο.	ζ	ιε	δ΄
132		ὁ βορειότατος τῶν ἐν τῇ ἀποτομῇ	σξγ	ν	νο.	ς	ø	δ΄
133		τῶν εἰρημένων ἐν τῇ οὐρᾷ τοῦ Κριοῦ τριῶν ὁ ἑπόμενος	σξδ	λ	βο.	α	ν	δ΄
134		τῆς Πλειάδος τὸ βόρειον πέρας τῆς ἡγουμένης πλευρᾶς	σξθ	μ	βο.	δ	λ	νεφ.
135		τὸ νότιον πέρας τῆς ἡγουμένης πλευρᾶς τῆς Πλειάδος	σο	ø	βο.	γ	μ	νεφ.
136		τὸ μέσον τῆς Πλειάδος τῆς ἡγουμένης πλευρᾶς	σο	λ	βο.	δ	ø	νεφ.
137		τὸ ἑπόμενον καὶ στενότατον μέρος τῆς Πλειάδος	σοα	ι	βο.	γ	κ	νεφ.
138		ὁ ἐν τῷ στήθει τοῦ Ταύρου	σοα	ι	νο.	η	ø	γ΄
139		ὁ ἀπὸ ἄρκτων τῆς Πλειάδος	σοα	ι	βο.	ε	ø	δ΄
140		τῶν ἐν τῇ Ὑάδι ὁ ἡγούμενος καὶ ἐπὶ τοῦ ῥύγχους τοῦ Ταύρου	σος	λ	νο.	ε	με	γ΄ ἐλ.
141		τῶν ἑπομένων αὐτῷ δύο ἐπὶ τῶν ὀφθαλμῶν ὁ βορειότερος	σοζ	ν	νο.	δ	ιε	γ΄ ἐλ.
142		ὁ νοτιώτερος τῶν δύο τῶν εἰρημένων	σοη	κ	νο.	ε	ν	γ΄ ἐλ.
143		τῶν λοιπῶν καὶ ἑπομένων δύο ὁ βορειότερος	σοθ	κ	νο.	γ	ø	γ΄ ἐλ.
144		ὁ ἐπὶ τοῦ ἑπομένου γόνατος τοῦ Ταύρου	σοθ	μ	νο.	ι	ø	δ΄
145		ὁ λοιπὸς τῶν ἐν τῇ Ὑάδι, καλούμενος Λαμπρός	σπ	ι	νο.	ε	ι	α΄
146		ὁ ἐπὶ τῆς ἐκφύσεως τοῦ βορείου κέρατος τοῦ Ταύρου	σπγ	ι	νο.	ø	ιε	δ΄
147		ὁ ἐπὶ τῆς ἐκφύσεως τοῦ νοτίου κέρατος τοῦ Ταύρου	σπδ	μ	νο.	δ	ø	δ΄
148		τῶν ἐν τῇ δορᾷ τοῦ Ὡρίωνος δύο συνεχῶν ὁ ἡγούμενος	σπς	ν	νο.	η	ι	δ΄
149		ὁ ἑπόμενος τῶν δύο τῶν εἰρημένων	σπη	ø	νο.	η	ø	δ΄
150		ὁ ἐπ᾽ ἄκρου τοῦ βορείου κέρατος καὶ κοινὸς τοῦ ποδὸς τοῦ Ἡνιόχου	σϙγ	ι	βο.	ε	ø	γ΄
151		ὁ ἐπ᾽ ἄκρου τοῦ νοτίου κέρατος τοῦ Ταύρου	σϙε	ι	νο.	β	ι	γ΄
152	Διδύμων	ὁ προηγούμενος τοῦ Πρόποδος τοῦ ἡγουμένου Διδύμου	τα	μ	νο.	ø	μ	δ΄
153		τῶν ἐν τῇ δεξιᾷ λαβῇ τοῦ Ὡρίωνος δύο ἐκφανῶν ὁ προηγούμενος	τγ	λ	νο.	θ	με	δ΄
154		ὁ ἑπόμενος τῶν εἰρημένων δύο ἐκφανῶν	τδ	ø	νο.	ι	ø	δ΄ με.
155		ὁ προηγούμενος τῶν γονάτων τῶν Διδύμων ὡς ἐπ᾽ εὐθείας αὐτῶν	τδ	ø	βο.	ε	ν	δ΄ με.
156		τῶν ἐν τῷ ποδὶ τοῦ ἡγουμένου Διδύμου ὁ καλούμενος Πρόπους	τδ	ø	νο.	α	λ	δ΄ με.

157		ὁ ἑπόμενος αὐτῷ καὶ καλούμενος Ποὺς ἡγούμενος	τ̄ε̄	μ̄	νο.	ᾱ̈	ῑε̄	δ΄ με.
158		ὁ τούτου νοτιώτερος καὶ ἐπὶ τοῦ δευτέρου ποδὸς τοῦ δεξιοῦ Διδύμου	τ̄ζ̄	μ̄	νο.	γ̄	λ̄	δ΄ με.
159		ὁ ἔτι τούτου νοτιώτερος καὶ ἐπὶ τοῦ τρίτου ποδὸς ἐκφανής	τ̄θ̄	λ̄	νο.	ζ̄	λ̄	γ΄
160		τῶν ἐν τοῖς γόνασι τῶν Διδύμων ὡς ἐπ᾽ εὐθείας τριῶν ὁ ἡγούμενος	τ̄ῑ	λ̄	βο.	ᾱ̈	λ̄	γ΄
161		ὁ ἐν τῷ ἡγουμένῳ πήχει τοῦ ἡγουμένου Διδύμου	τ̄ῑδ̄	ῑ	βο.	ῑ	ø	δ΄
162		τῶν εἰρημένων ἐν τοῖς γόνασι τῶν Διδύμων τριῶν ὁ μέσος	τ̄ῑε̄	μ̄ε̄	νο.	β̄	λ̄	γ΄
163		τῶν ἐν τοῖς ὤμοις τῶν Διδύμων ὁ ἡγούμενος	τ̄ῑς̄	ῑ	βο.	ζ̄	κ̄	δ΄
164		ὁ ὑπὲρ τὰ γόνατα, ὃν Ἵππαρχος καλεῖ Ὀμφαλόν	τ̄ῑθ̄	ῑ	νο.	ø	λ̄	γ΄
165		ὁ λοιπὸς καὶ ἑπόμενος τῶν ἐν τοῖς γόνασι τῶν Διδύμων τριῶν	τ̄ῑθ̄	ῑ	νο.	ς̄	ø	γ΄
166		τῶν ἐν τοῖς ὤμοις τῶν Διδύμων ὁ μετὰ τὸν ἡγούμενον	τ̄ῑθ̄	λ̄	βο.	ε̄	λ̄	δ΄
167		ὁ ἐπὶ τῆς κεφαλῆς τοῦ ἡγουμένου Διδύμου	τ̄κ̄	ν̄	βο.	θ̄	μ̄	β΄
168		ὁ ὑπ᾽ αὐτὸν καὶ τρίτος τῶν ἐν τοῖς ὤμοις	τ̄κ̄ᾱ̈	λ̄	βο.	δ̄	ν̄	δ΄
169		ὁ λοιπὸς καὶ ἑπόμενος τῶν ἐν τοῖς ὤμοις	τ̄κ̄δ̄	ῑ	βο.	β̄	μ̄	δ΄
170		ὁ ἐπὶ τῆς κεφαλῆς τοῦ ἑπομένου Διδύμου	τ̄κ̄δ̄	ῑ	βο.	ς̄	ῑε̄	β΄
171		ὁ ἑπόμενος τῇ χειρὶ τοῦ ἑπομένου Διδύμου	τ̄κ̄η̄	ῑ	νο.	β̄	μ̄	δ΄ με.
172		ὁ ἔτι τούτῳ ἑπόμενος ἀπὸ μεσημβρίας	τ̄λ̄δ̄	μ̄	νο.	ζ̄	λ̄	δ΄ με.
173	Καρκίνου	τῶν προηγουμένων δύο τοῦ νεφελίου <τοῦ> Καρκίνου ὁ βορειότερος	τ̄λ̄ε̄	ῑ	βο.	ᾱ̈	ῑε̄	δ΄ ἐλ.
174		ὁ νοτιώτερος τῶν δύο τῶν εἰρημένων	τ̄λ̄ε̄	λ̄	νο.	ᾱ̈	ῑ	δ΄ ἐλ.
175		ὁ μέσος τοῦ νεφελίου τοῦ ἐν τῷ μέσῳ τοῦ Καρκίνου, καλούμενος Φάτνη	τ̄λ̄ζ̄	ν̄	βο.	ø	μ̄	νεφ.
176		τῶν ἑπομένων τοῦ νεφελίου δύο, καλουμένων Ὄνων, ὁ βορειότερος	τ̄λ̄ζ̄	ν̄	βο.	β̄	μ̄	δ΄ με.
177		ὁ νοτιώτερος τῶν Ὄνων	τ̄λ̄η̄	ν̄	νο.	ø	ῑ	δ΄ με.
178		ὁ ὑπὲρ τὸν ἀγκῶνα τῆς νοτίου χηλῆς τοῦ Καρκίνου	τ̄μ̄β̄	μ̄	νο.	β̄	κ̄	δ΄ με.
179		ὁ ἐπ᾽ ἄκρας τῆς νοτίου χηλῆς τοῦ Καρκίνου	τ̄μ̄δ̄	ø	νο.	ε̄	λ̄	δ΄
180	Λέοντος	ὁ ἐπ᾽ ἄκρου τοῦ μυκτῆρος τοῦ Λέοντος	τ̄μ̄ε̄	ν̄	βο.	ῑ	ø	δ΄
181		ὁ ἐν τῷ χάσματι τοῦ Λέοντος	τ̄μ̄η̄	μ̄	βο.	ζ̄	λ̄	δ΄
182		ὁ ἑπόμενος τῷ ἐπ᾽ ἄκρας τῆς νοτίου χηλῆς τοῦ Καρκίνου	τ̄μ̄θ̄	ῑ	νο.	ε̄	μ̄	δ΄ ἐλ.
183		τῶν ἐν τῇ κεφαλῇ τοῦ Λέοντος δύο ὁ νοτιώτερος	τ̄ν̄ᾱ̈	μ̄	βο.	θ̄	λ̄	γ΄ με.
184		ὁ ἐπὶ τῆς ἡγουμένης δρακὸς τοῦ Λέοντος	τ̄ν̄δ̄	ν̄	νο.	δ̄	ῑ	δ΄ με.
185		τῶν ἐν τῷ τραχήλῳ τοῦ Λέοντος τριῶν ὁ νοτιώτατος	τ̄ν̄η̄	ῑ	βο.	δ̄	λ̄	γ΄
186		ὁ μέσος τῶν ἐν τῷ τραχήλῳ τοῦ Λέοντος τριῶν	τ̄ν̄θ̄	μ̄	βο.	η̄	λ̄	β΄

Titulum om. **V** | ΑΣΤΕΡΩΝ **M**: ΤΩΝ **H**, om. **F** | ΤΩΝ ΙΒ̄ ΖΩΙΔΙΩΝ ΔΙΑΜΟΡΦΩΣΕΙΣ post ΤΕΤΑΡΤΟΥ add. **M** ||

1 titulum Λέοντος **F M V**: add. **H** manu recentiore | μέγ. α΄ **F M V**: δ΄ **H** || 2 ἡγουμένου γόνατος **F H V**: ἡγουμενου τοῦ γόνατος **M** || 3 τοῦ ἐπὶ τῆς καρδίας τοῦ Λέοντος **V**: τῶν ἐπὶ τῆς καρδίας τοῦ Λέοντος **F M**, τ̔ ε̄ τ̂ ♌ (fort. τοῦ ἐπὶ τῶν Λέοντος?) **H**^{ac}, τ̔ ε̄ τ̃ ο τ̔ ♌ (fort. τοῦ ἐπὶ τῆς καρδίας τοῦ Λέοντος?) **H**^{pc} | καὶ <ὡς ἐπὶ> τοῦ στήθους scripsi ex *Alm.* 2.98.7: καὶ τοῦ στήθους **F**^{pc} **H**, τοῦ στήθους **F**^{ac}, om. **M V** | μῆκ. α̅ ø **F**^{pc} **H M V**: λ̄ ø **F**^{ac}|| 4 ὁ **F H M**, τὰ **V** | ἐπὶ **F M V**: ἐν **H** | Ἵππαρχος **F M H**:Ἵπαρχος **V** | ἐπὶ om. **H** | τοῦ Λέοντος **M V**: ♌ **H**, om. **F** || 5 γλουτοῦ **F H M**: γλουτροῦ **V** | τοῦ Λέοντος λαμπρός **F H M**: λαμπρὸς τοῦ Λέοντος **V** | μέγ. γ΄ **F H V**: δ΄ **M** || 6 τῶν **F M V**: τοῦ **H** | μέγ. δ΄ **F H V**: γ΄ **M** | ἐλ. om. **H M V** || 7-8 stellarum nomina, sed non positiones, commutavit **H** || 7 ἐπὶ τῶν ὀπισθίων μηρῶν **F M V**: ἐν τῷ ὀπισθίῳ μηρῷ **H** | μέγ. γ΄ **H M V**: ι΄ **F** || 8 μέγ. δ΄ **F H V**: γ΄ **M** || 9 ἐπὶ τῆς κνήμης **F M V**: ἐν τῶν κνημῶν **H** | τοῦ Λέοντος **F H**: αὐτοῦ **V**, post πόδα transtulit **M** | Ἵππαρχος **F H M**:Ἵπαρχος **V** | καλεῖ **F M V**: καλε **H** | ὀπίσθιον πόδα **V**: ὀπίσθιον πόδα τοῦ Λέοντος **M**, ὀπισθίων ποδῶν **F**, ὀπισθίων ποδῶν τῆς Παρθένου **H** | νο. scripsi: βο. codd. || 10 νοτίου scripsi: νοτίας codd. | μέγ. γ΄ **F H V**: δ΄ **M** || 11 αὐτοῦ καὶ νοτίου πτέρυγος δεύτερος scripsi: αὐτοῦ καὶ νότιος δεύτερος **F**, καὶ νοτιώτερος αὐτοῦ **M**, Ν́ (ex αὐτοῦ) νοτιότερος καὶ δεύτερος ὑπ᾽ αὐτοῦ **H** (καὶ ante νοτιότερος postea inserto), καὶ δεύτερος ὢν νοτιώτερος αὐτοῦ **V** || 12 ἔτι **M**: ἐπὶ **F V**, ε̄ (fort. ἐν?) **H** | τούτῳ **F V**: τούτων **H M** | Ἵππαρχος **F H M**:Ἵπαρχος **V** | ὦμον **F M V**: ὤμου **H** | πλά. β̄ ν̄ **H M V**: β̄ ι̅γ̄ **F** || 13 ἐν τῷ βορείῳ πλευρῷ scripsi ex *Alm.* 2.102.12: ἐν τῷ βορείῳ ὤμῳ **H**, ἐπὶ τοῦ βορείου ὤμου **M**, ἐπὶ τοῦ βορείου μέρους **F V** | ὃν Ἵππαρχος καλεῖ βόρειον ὦμον om. **M** | Ἵππαρχος **F H**:Ἵπαρχος **V** | βόρειον ὦμον **H V**: ὦμον βόρειον **F** | πλά. η̄ ι̅ε̄ **F H V**: β̄ ι̅ε̄ **M** || 14 τέταρτος **F H V**: διὰ **M** | τῶν ἀπὸ τοῦ scripsi: τοῦ αὐτοῦ **H**, τῷ ἀπὸ τῆς **F**, τῶν **M V** | ἐπ᾽ ἄκρας τῆς **M V**: ἐπ᾽ ἄκρου τῆς **F**, ἐπ᾽ ἄκρου **H** | νοτίου scripsi: νοτίας codd. | τῆς Παρθένου om. **V** | μῆκ. μ̄η̄ λ̄ **F V**, μ̄η̄ α̅ **H** | πλά. α̅ λ̄ **F H**: α̅ λ̄δ̄ **V**, α̅ λ̄α̅ **M** | μέγ. δ΄ **F H V**: γ΄ **M** || 15 γλουτοῦ **F M**: γλουτροῦ **V**, γλουτῷ **H** | Ἵππαρχος **F M**:Ἵπαρχος **H V** | καλεῖ **F M V**: καλῖ **H** | δεξιὸν ἀκρόχειρον **F M**: δεξιὸν ἀκρόχειδρον **V**, δεξιὰ ἀκρόχειδρα **H** | βο. **F M V**: νο. **H** | μέγ. γ΄ **F H V**: δ΄ **M** || 16 τῆς Παρθένου λαμπρός **F H**: λαμπρὸς τῆς Παρθένου **V**, τῆς Παρθένου om. **M** | νο. **F M**: βο. **H V** | μέγ. α΄ **H M**: δ΄ **F V** || 17-34 deest **V** || 17 τοῦ βορειοτέρου <τοῦ> Στάχυος τετραπλεύρου scripsi: τοῦ βορειωτέρου Στάχυος λαμπρὸς τετραπόδου **H**, ὁ ἐπὶ τοῦ βορειοτέρου Στάχυος τετραπλεύρου **F**, ὁ ἐπὶ τοῦ βορείου Στάχυος **M** | ὁ ἑπόμενος **H**: λαμπρός **F M** | βο. **F M**: νο. **H** | μέγ. δ΄ **F H**: α΄ **M** || 18 τριῶν ὁ μέσος **F H** : ὁ ἡγούμενος **M** || 19 τῶν ἐν τῷ σύρματι τριῶν **F**: αὐτῶν **M**, αὐτῶν ἐν τῷ σύρμαρι (postea corr. σύρματι) τρίτος **H** || 21 ἐπὶ **F M**: ἐν **H** || 22 titulum Ζυγοῦ **F M**: Χηλῶν **H** | τῆς om. **H** | νοτίου scripsi: νοτίας codd. | τοῦ om. **H** | λαμπρός om. **M** | πλά. ø μ̄ **F**: ς̄ μ̄ **H M** || 23 ἐπὶ **F**: ἐν **H**, om. **M** | Χηλῆς **F M**: Χηλῖς **H** | βο. **F H**: νο. **M** | μέγ. δ΄ **F H**: β΄ **M** || 24 βορείου **F H**: νοτίας **M** | λαμπρός om. **F H** | μέγ. β΄ **F H**: δ΄ **M** || 26 ἐν μέσῃ τῇ νοτίῳ Χηλῇ scripsi: ἐν μέσῃ τῇ νοτίᾳ Χηλῇ **F M**, ἐν μέσῳ τῆς νοτίας Χηλῆς **H** || 27 ἐν μέσῃ τῇ βορείῳ Χηλῇ **F**: ἐν μέσῃ τῇ βορείᾳ χηλῇ **M**, ἐν μέσῳ τῆς βορείου Χηλῆς **H** || 28 μεταξὺ **F M**: σμεταξὺ **H** || 29 δύο τῆς νοτίου Χηλῆς **H**: δύο νοτιωτέρου Χηλῆς **F**, τῷ νοτίῳ δύο **M** | ἐκφανῶν **H M**: ἐκφανής **F** | ὁ βορειότερος scripsi: ὁ βορειώτερος **F H**, om. **M** | ἐλ. om. **H M** || 30 νοτιώτερος **H M**: νοτιότερος **F** | αὐτῶν **F**: αὐτοῦ **H**, τούτων **M** | πλά. θ̄ μ̄ **F H**, η̄ μ̄ **M** | ἐλ. om. **M** || 31 ἐπὶ τῆς ἐκφύσεως **M**: ἐπὶ τῇ ἐκφύσει **F**, ἐν τῇ ἐκφύσι **H** | βορείου scripsi: βορείας codd. | πλά. γ̄ λ̄ **H M**: γ̄ α̅ **F** | ἐλ. om. **M** || 32 βορειότερος **M**: βορειώτερος **F**, βοριότερος **H** | αὐτοῦ **H**: αὐτῶν **F M** | μῆκ. ϙ̄ μ̄ **M**: ϙα̅ μ̄ **F H** | ἐλ. om. **M** || 33 ἀπ᾽ ἄρκτου **F**: ἐπ᾽ ἄκρου **H M** | βορείου **F**: βορείας **H M** | τοῦ Σκορπίου ὁ βορειότατος om. **M** | βορειότατος scripsi: βορειώτερος **F**, βωριώτερος **H** | ἐλ. om. **M** || 34 titulum Σκορπίου huc transtuli: ad l. 33 exhibet **M**, ad l. 37 **F**, bis (ad ll. 30 et 37) **H** | ὁ om. **H** | δεύτερος ἀπὸ τοῦ **F**: δεύτερος αὐτοῦ **H**, om. **M** | βορειοτάτου scripsi: βορειωτάτου **F**, βοριοτάτου **H**, βορειότερος **M** || 35 ἀπὸ om. **H** | βορειοτάτου **M**: βορειωτάτου **F**, βοριωτάτου **H**, βορειοτέρου **V** | τῶν ἐν τῷ μετώπῳ τοῦ Σκορπίου **F**: ἐν τῷ μετώπῳ τοῦ Σκορπίου **H**, τῶν ἐν τῷ μετώπῳ **V**, om. **M** || 36-37 stellarum nomina et positiones commutavit **H** || 36 νοτιώτερος **H M V**: νοτιότερος **F** | ἀπὸ τοῦ βορειοτάτου **M**: ια^{υ} τοῦ βοριωτάτου **H**: ἀπὸ τοῦ βορειοτέρου **V**, ἀπὸ τῶν βορειωτέρων **F** | νο. **M**: βο. **F H V** || 37 βορειότατος **M V**: βορειώτατος **F**, βοριώτατος **H** | τῶν om. **H** | τοῦ Σκορπίου om. **M V** || 38 τῶν παρακειμένων δύο **M V**: τῶν ἀπ᾽ ἄρκτου παρακειμένων δύο **F**, τῶν ἀπ᾽ ἄκρου **H** | τῷ βορειοτάτῳ scripsi ex *Alm.* 2.110.4: βορειοτάτων **M V**, βοριωτέρων **H**, βορείων **F** | νοτιώτερος **H M V**: νοτιότερος **F** || 39 βορειότερος **M V**: βορειώτερος **F**, βοριώτερος **H** | αὐτῶν **F M V**: αὐτοῦ **H** | βο. **F H V**: νο. **M** || 40 ἐπὶ **F M V**: ἐν **H** | ἡγουμένου om. **M** | ποδὸς **F M H**: πόλος **V** || 41 τριῶν om. **V**, add. **H** s.l. | ἡγούμενος **F M V**, προηγούμενος **H** || 42 αὐτῶν **F H**^{pc} **M**: αὐτοῦ **H**^{ac}, αὐτῷ **V** | ὑπόκιρρος **F H M**: ὑπόχειρος **V** | καλούμενος **F H**

M: ὁ καλούμενος **V** || 43 τῶν τριῶν **F**: γ΄ **H**, om. **M V** | ἀστέρων post τριῶν add. **F** | στήθει **F M V**: στίθη **H** | μῆκ. $\overline{\rho\beta}$ ø **F H V**: $\overline{\rho\beta}$ $\bar{\lambda}$ **M** || 44 ἐπὶ **F M V**: ἐν **H** | ἐπομένου **H M V**: ἡγουμένου **F** | μῆκ. $\overline{\rho\eta}$ $\bar{\mu}$ **F H M**: $\overline{\rho\eta}$ $\bar{\eta}$ **V** | βο **F H M**: νο **V** || 45 τῶν ἐν om. **V** | τριῶν om. **H M V** | προηγούμενος **F V**: ἡγούμενος **M**, βοριότερος **H** | πλά. $\bar{\beta}$ $\bar{\iota\varepsilon}$ **H M V**: ø $\bar{\iota\varepsilon}$ **F** || 46 ἐπὶ τῆς ἐπομένης **F M V**: ἐν τῷ ἐπομένῳ **H** | γαστροκνημίας **F H M**: γαστροκνημίδος **V** | με. om. **M V** || 47 τῶν **F H M**: ὁ **V** | ἀπὸ τοῦ ἡγουμένου om. **V** | με. om. **F M V** || 48 ἀπὸ τοῦ **F M V**: αὐτοῦ **H** | με. om. **M V** || 49 ἀπ᾽ ἄρκτου **F H M**: ἀπὸ ἄρκτου **V** | τοῦ κέντρου om. **V** | ὁ om. **H** | με. om. **M V** || 50 ἐπὶ **F M V**: ἐν **H** || 51-52 stellarum nomina et positiones commutavit **M** || 51 τῶν ἐν τῷ τόξῳ τοῦ Τοξότου **H**: τῶν ἐν τῷ τόξῳ τοῦ τόξου **V**, τῶν ἐν τῷ τόξῳ $\bar{\beta}$ **F**, om. **M** | βορειότατος **V**^{pc}: βορειοτάτου **V**^{ac}, βοριότερος **M**, βορειώτερος **H F** | καὶ ἐπ᾽ ἄκρου τοῦ τόξου **M**: τοῦ τόξου **F**, om. **H V** | μῆκ. $\overline{\rho\kappa\delta}$ $\bar{\iota}$ **F M V**: $\overline{\rho\kappa\delta}$ $\bar{\gamma}$ **H** | πλά. $\bar{\beta}$ $\bar{\nu}$ **F M V**: $\bar{\varsigma}$ $\bar{\nu}$ **H** || 52 τρίτος ἀπὸ τοῦ **F V**: τρίτος αὐτοῦ **H**, om. **M** | βορειοτάτου scripsi: βορειωτάτου **F**, βοριωτάτου **H**, βορειότατος **V**, om. **M** | καὶ κατὰ τῆς λαβῆς τοῦ Τοξότου **V H**^{pc}: καὶ κατὰ τῆς λαβῆς τοῦ τόξου **F H**^{ac}, ἐν τῇ λαβῇ τῆς ἀριστερᾶς χειρός **M** (= *Alm.* 2.112.1) || 53 ἀπὸ τοῦ **F M V**: αὐτοῦ **H** | βορειοτάτου **M V**: βορειωτάτου **F**, βοριωτάτου **H** | τόξῳ τοῦ Τοξότου **M**: τόξῳ **F H**^{ac} **V**, Τοξότῃ **H**^{pc} || 54 τῶν **F M V**: ἐν τῶν **H** | ἐν τῇ ὠμοπλάτῃ **M V**: ἐν τῷ ὠμοπλάτῃ **H**, ἐν τῷ ὠμοπλάτει **F** | τοῦ Τοξότου om. **F** | τοῦ τετραπλεύρου om. **H V** | μῆκ. $\overline{\rho\lambda}$ $\bar{\lambda}$ **F H M**: $\overline{\rho\lambda\alpha}$ $\bar{\lambda}$ **V** | με. **F H**^{pc}: ἐλ. **H**^{ac}, om. **M V** || 55 τοῦ ὀφθαλμοῦ **M**: τὸν ὀφθαλμὸν **F H**: τῶν ὀφθαλμῶν **V** | τοῦ Τοξότου **H M V**: αὐτοῦ **F** | νεφελοειδής **M V**: νεφελοειδές **H**, νεφελοειδὴς τῷ τετραπλεύρῳ **F** | νεφ. scripsi: δ΄ νεφ. **H**, δ΄ **F M V** | οὗτος διπλοῦς ἐστι add. **M** in marg. || 56 τοῦ τετραπλεύρου τῶν $\bar{\beta}$ **M V**: τοῦ τετραπλεύρου $\bar{\beta}$ **H**, τῶν ἐν τῇ τετραπλεύρῳ $\bar{\beta}$ **F** | ἀντιγωνίων Ruggeri: ἀντικνημίων **M**, ὁ ἐν τῷ ἀντικνημίῳ **F H V** | ὁ βορειότερος **F**: ὁ βοριότερος **H**, ὁ βόρειος **M**, βοριότατος **V** | μέγ. γ΄ **F H V**: δ΄ **M** || 57 βορειότερος **F M V**: βοριώτερος **H** | τῆς om. **H** | τοῦ Τοξότου **M**: αὐτοῦ **F H V** | βο. **F H M**: νο. **V** || 58 εἰρημένων **F M V**: ἠρημένων **H** | $\bar{\beta}$ λαμπρῶν **M**: λαμπρῶν $\bar{\beta}$ **F H V** | ἀντιγωνίων Ruggeri: ἀντικνημίων **H V**, τῶν ἀντικνημίων **F**, om. **M** | νοτιώτερος **H M**: βορειώτερος **F**, βορειότερος **V** | μέγ. γ΄ **F H V**: δ΄ **M** || 59 πλά. $\bar{\delta}$ $\bar{\lambda}$ **F H V**: $\bar{\delta}$ $\bar{\mu}$ **M** || 60 τριῶν **H M V**: τῶν τριῶν **F** | μῆκ. $\overline{\rho\lambda\varepsilon}$ $\bar{\iota}$ **F H V**: $\overline{\rho\lambda\varsigma}$ $\bar{\mu}$ **M** | πλά. $\bar{\alpha}$ $\bar{\lambda}$ **F H V**: $\bar{\beta}$ $\bar{\nu}$ **M** || 61 stellae nomen om. **M**, eius positionem stellae 62 adtribuens || 62-68 positiones stellarum falsas exhibet **M**, unicuique stellae positionem antecedentis tribuens || 62 ταῖς **F M V**: τῆς **H** | ἐφαπτίσι **H M**: ἐφαπτίσιν **V**, ἐφαπτήσι **F** | δύο ἐκφανῶν **F M V**: ἐκ τοῦ $\bar{\beta}$ φανῶν **H** | νοτιώτερος **H M V**: νοτιότερος **F** || 63 βορειότερος **H V**: βορειώτερος **F**, βορειότατος **M** | αὐτῶν **F M V**: αὐτοῦ **H** || 64 ἐπὶ **F M V**: ἐν **H** | τοῦ om. **H** | τοῦ Τοξότου om. **M** | νο. **F H V**: βο. **M** | πλά. $\bar{\beta}$ $\bar{\nu}$ **F H M**: $\bar{\zeta}$ $\bar{\nu}$ **V** || 65 κέρασι **H M**: κέρασιν **F V** | Αἰγόκερω **M**: Αἰγοκέρωτος **V**, Αἰγοκέρου **F**, Αἰγοκαίρου **H** | δύο om. **M** | νοτιώτερος **H M V**: νοτιότατος **F** | μῆκ. $\overline{\rho\nu\delta}$ $\bar{\nu}$ **F M V**: duas positiones huic stellae tribuit **H**, $\overline{\rho\nu\alpha}$ $\bar{\nu}$ et $\overline{\rho\nu\delta}$ $\bar{\iota}$ || 66 om. **V** | βορειότερος **M**: βορειώτερος **F**, βοριώτερος **H** | αὐτῶν **F M**, αὐτοῦ **H** || 67 ἐπὶ **F M V**: ἐν **H** | βορείου **F M V**: βορίου **H** | γόνατος **V**: κέρατος **F H M** | Αἰγόκερω **M**: Αἰγοκέρωτος **V**, Αἰγοκέρου **F**, Αἰγοκαίρου **H** | νο. **F H V**: βο. **M** || 68 ἐπὶ **F M V**: ἐν **H** | γόνατος **V**: κέρατος **F M**, καίρατος **H** | Αἰγόκερω **M**: Αἰγοκέρωτος **V**, Αἰγοκέρου **F**, Αἰγοκαίρου **H** | stellae positionem om. **M** || 69 Ὑδροχόου **F M**: Ὑδριχόου **H V** | τριῶν om. **H** | βορειότατος scripsi: βορειότερος **V**, βορειώτερος **F**, βοριότερος **H**, νοτιώτερος **M** || 70 μῆκ. $\overline{\rho\xi\gamma}$ $\bar{\mu}$ **F M V**: $\overline{\rho\xi\varsigma}$ $\bar{\mu}$ **H** | βο. om. **V** | πλά. $\bar{\eta}$ ø om. **V** | μέγ. δ΄ om. **V** || 71 τῆς ὠμοπλάτης **H M V**: τοῦ ὠμοπλάτου **F** | Αἰγόκερω **M**: Αἰγοκέρου **F V**, Αἰγοκαίρου **H** | μῆκ. $\overline{\rho\xi\delta}$ $\bar{\iota}$ om. **V** | πλά. $\bar{\zeta}$ $\bar{\mu}$ **F H**: $\bar{\zeta}$ $\bar{\kappa}$ **M** || 72 νώτῳ **H**: νότῳ **F V**, νοτίῳ **M** | τοῦ Αἰγόκερω δύο scripsi: $\bar{\beta}$ τοῦ ♑ **M**, τοῦ Αἰγοκέρου $\bar{\beta}$ **F**, τοῦ Αἰγοκαίρου $\bar{\beta}$ **H**, δύο **V** | νο. **F V**: βο. **H M** | πλά. ø ø **F H V**: $\bar{\zeta}$ ø **M** || 73 Ὑδροχόου **F M**: Ὑδριχόου **V**, Ὑδρηχόου **H** | νοτιώτατος scripsi: νοτιώτερος **V**, νοτιότερος **F H**, βορειότερος **M** || 74 τοῦ Αἰγόκερω δύο συνεχῶν **M**: τοῦ Αἰγοκέρωτος δύο συνεχῶν **V**, συνεχῶν τοῦ Αἰγοκαίρου $\bar{\beta}$ **H** (τοῦ s.l. inserto), τοῦ Αἰγοκέρου $\bar{\beta}$ **F** | προηγούμενος **V**: ἑπόμενος **H**, νοτιότερος **F**, βορειότερος **M** || 75-76 stellarum nomina, sed non positiones, commutavit **V** || 75 τῶν ἐν τῷ νώτῳ τοῦ Αἰγόκερω δύο ὁ ἑπόμενος scripsi: τῶν ἐν τῷ νότῳ αὐτοῦ δύο ὁ ἑπόμενος **F**, τῶν ἐν τῷ νώτῳ τοῦ Αἰγοκαίρου δύο ὁ ἑπόμενος **H**, τῶν ἐν τῷ νοτίῳ τοῦ Αἰγοκέρωτος δύο ὁ ἑπέμενος **V**^{ac}, τῶν ἐν τῷ νότῳ τοῦ Αἰγοκέρωτος δύο ὁ ἑπόμενος **V**^{pc}, τῶν ὑπὸ τὴν κοιλίαν $\bar{\beta}$ ὁ νοτιώτερος **M** | μῆκ. $\overline{\rho\xi\eta}$ $\bar{\kappa}$ **F H M**: $\overline{\rho\xi\zeta}$ $\bar{\kappa}$ **V** | πλά. ø $\bar{\nu}$ **F H M**: $\bar{\varsigma}$ $\bar{\nu}$ **V** || 76 νοτίῳ **F M V**: νοτίᾳ **H** | προηγούμενος **F H V**: νοτιώτερος **M** | νο. **F H V**: βο. **M** || 77 τῶν **F H V**: ὁ ἑπόμενος τῶν **M** | τῷ **F M V**: τῇ **H** | τοῦ Αἰγόκερω scripsi: τοῦ Αἰγοκέρωτος **V**, τοῦ Αἰγοκέρου **F**, τοῦ Αἰγοκαίρου **H**, om. **M** | λαμπρῶν **F M V**: λαμπρὸς **H** | positionem ad l. 79 spectantem exhibet **M** || inter ll. 77 et 78 stellam ad l. 80 pertinentem transtulit **M** | ibid. stellam et Almagesto et ipso caelo ignotam add. **F H**^{pc}: ὁ ἐπὶ τοῦ νοτίου κέρατος· μῆκ. $\overline{\rho o\beta}$ $\bar{\iota}$, πλά. βο. $\bar{\beta}$ $\bar{\lambda}$, μέγ. δ΄ || 78 ἐν **F M**: ἐπὶ **H V** | νοτίῳ **F M V**: νοτίᾳ **H**^{ac}, νοτείᾳ **H**^{pc} | μῆκ. $\overline{\rho o\beta}$ $\bar{\lambda}$ **F M V**: $\overline{\rho o\beta}$ $\bar{\alpha}$ **H** || 79 δύο λαμπρῶν **F H V**: λαμπρός **M** | πλά. $\bar{\beta}$ ø **F V**: $\bar{\beta}$ $\bar{\lambda}$ **H M** || 80 ἡγουμένῳ **F H V**: ἑπομένῳ **M** | ὤμῳ **F M V**: ὄμῳ **H** | Ὑδροχόου **F H M**, Ὑδριχόου **V** | βο. scripsi: νο. codd. || 81 om. **H**^{ac} **V**, add. **H**^{pc} | ὁ **F M**: τῶν **H** | Αἰγόκερω scripsi: ♑ **M**,

Αἰγοκέρου **F**, Αἰγοκαίρου **H** | ἐκφανῆς **F**: ἐκφανεῖς **H**, ἐκφανέστατος **M** || 82-84 stellarum positiones, sed non nomina, commutavit **M** || 82 προηγουμένῳ **F H M**: ἡγουμένῳ **V** | γλουτῷ **F H**: γλουτρῷ **V**, μηρῷ **M** | Ὑδροχόου **F M**: Ὑδριχόου **H V** | ἀριστερὸν **F M V**: ἀριστερῶν **H** | πλά. $\overline{\alpha}$ $\overline{\mu}$ **F V**: $\overline{\alpha}$ $\overline{\nu}$ **H** || 83-85 stellarum nomina et positiones commutavit **M** || 83 τῶν **F H V**: τῶν $\overline{\beta}$ τῶν **M** | ἐπὶ τῆς ἐπομένης κοτύλης **F M**: ἐν τῇ ἐπομένῃ κοτύλων **H**, ἐκ τῆς ἐπομένης κοτύλης **V** | τοῦ Ὑδροχόου om. **H M V** | δύο ὁ λαμπρός **H**: ὁ λαμπρὸς τῶν δύο **F**, ὁ λαμπρός **M**, λαμπρός **V** || 84 ἐπὶ τοῦ ἐπομένου μηροῦ **F V**: ἐν τῷ ἐπομένῳ μηρῷ **H**, ἐν τῷ προηγουμένῳ μηρῷ **M** | τοῦ Ὑδροχόου **M**: αὐτοῦ **F**, om. **H V** | Ἵππαρχος **F H M**: Ἵπαρχος **V** | δεξιὸν **F M V**: δεξιοῦ **H** | πλά. ø $\overline{\nu}$ **F H V**: ø $\overline{\nu\delta}$ **M** || 85 τῷ ἐπομένῳ **H M V**: τῇ ἐπομένῃ **F** | πήχει **F M V**: πίχυ **H** | Ὑδροχόου **F M**: Ὑδριχόου **H V** | καὶ **F H V**: ὁ **M** | βο. **F H M**: νο. **V** || 86 τῶν **F H M**: ὁ **V** | ἐν τῇ ἐπομένῃ κνήμῃ **H**: ἐπὶ τῆς ἐπομένης κνήμης **F M V** | τοῦ Ὑδροχόου **M**: τοῦ Ὑδρηχόου **H**, om. **F V** | δύο om. **M** | βορειότερος **V**: βορειώτερος **F**, νοτιώτερος **H M** || 87 νοτιώτερος **H M V**: νοτιότερος **F** | εἰρημένων **F H V**: προειρημήνων **M** || 88 ἐν τῇ κάλπιδι νοτίων δύο **F**: ἐν τῇ κάλπιδι δύο νοτίων **M**, ἐν τῇ καλπῖνος (?) νοτίων **H**, ἐπομένων νοῶν δύο **V** | δύο om. **H** | καῖ ἐπομένων om. **M** | ὁ om. **H** | ἡγούμενος **F H V**: προηγούμενος **M** | πλά. $\overline{\theta}$ ø **F H V**: $\overline{\theta}$ $\overline{\lambda}$ **M** || 89 ἐπόμενος **M**: μέσος **F H V** | τῶν δύο τῶν εἰρημένων **F H V**: αὐτῶν **M** || 90 ἐν τῷ ὕδατι ἀπὸ τῆς κάλπιδος **V**: ἐν τῷ ὕδατι τῶν ἀπὸ τῆς κάλπιδος **F**, ἐπὶ τοῦ ὕδατος τῆς κάλπιδος **M**, ἐν τῇ κάλπιδος τοῦ ὕδατος **H** | δύο om. **F** | νοτιώτερος **H V**, νοτιότερος **F**, ἐπ᾽ εὐθείας τοῦ βουβῶνος **M** | μέγ. δ΄ **F H V**: γ΄ **M** || 91 βορειότερος **M V**: βορειώτερος **F**, βοριώτερος **H** | μέγ. δ΄ **F H M**: α΄ **V** || 92 τοῦ ἐν τῷ ὕδατι τετραπλεύρου **F M**: τῶν ἐν τῷ ὕδατι τετραπλεύρων **V**, ἐν τῷ ὕδατι τέτρα **H** | πλά. $\overline{\alpha}$ $\overline{\iota}$ **F H M**: $\overline{\alpha}$ $\overline{\lambda}$ **V** || 93 τῶν ἐν τῷ τετραπλεύρῳ **F H M**: τῶν ἐν τῷ τετραπλεύρῳ $\overline{\alpha}$ **V** | μῆκ. $\overline{\rho\varrho\varsigma}$ $\overline{\lambda}$ **F H V**: $\overline{\rho\varrho\varsigma}$ $\overline{\kappa}$ **M** | πλά. $\overline{\gamma}$ $\overline{\lambda}$ **F H V**: $\overline{\gamma}$ $\overline{\iota\varepsilon}$ **M** || 94 τούτῳ **F M V**: τούτου **H** | καὶ om. **M** | αὐτοῦ **F H**: πρῶτος **V**, om. **M** | πλά. $\overline{\delta}$ $\overline{\iota}$ **F H V**: $\overline{\delta}$ ø **M** || 95 λοιπῶν **F M V**: λυπῶν **H** | ὁ om. **H** | βορειότερος **M V**: βορειώτερος **F**, βοριώτερος **H** | μῆκ. $\overline{\rho\varrho\zeta}$ $\overline{\lambda}$ **F M H**: $\overline{\rho\varrho\zeta}$ $\overline{\kappa}$ **V** || 96 νοτιώτερος **H V**: νοτιότερος **F**, λαμπρότερος **M** | τῶν δύο om. **V** | εἰρημένων **F M V**: ἠρημένων **H** || 97 δ΄ **H M V**: δ΄ με. **F** || 98 αὐτῷ **F M V**: αὐτοῦ **H** | ἐπὶ τοῦ κρανίου **F V**: ἐν τῷ κρανίου **H**, ἐπὶ τοῦ λίνου τῶν Ἰχθύων **M** | ὁ νοτιώτερος scripsi: ὁ νοτιότερος **F**, ὁ νοτιώτατος **H V**, om. **M** | μῆκ. $\overline{\sigma\alpha}$ $\overline{\mu}$ **F H M**: $\overline{\sigma\alpha}$ $\overline{\delta}$ **V** || 99 βορειότερος **M V**: βορειώτερος **F**, βοριώτερος **H** | μῆκ. $\overline{\sigma\gamma}$ $\overline{\lambda}$ **F H M**: $\overline{\sigma\gamma}$ $\overline{\mu}$ **V** | πλά. $\overline{\theta}$ $\overline{\kappa}$ **F M V**: $\overline{\zeta}$ $\overline{\kappa}$ **H** || 100 νοτίου om. **M V** | δύο **H M V**: τῶν δύο **F** | ἡγούμενος **F M V**: προηγούμενος **H** | πλά. $\overline{\delta}$ $\overline{\lambda}$ **F H V**: $\overline{\delta}$ $\overline{\nu}$ **M** || 101 νώτῳ **F M**: νοτίῳ **V**, νοτίου **H** | τοῦ om. **H** | νοτίου **H**^{pc}: om. **F H**^{ac} **M V**| δύο **H V**: τῶν δύο **F**, om. **M** | ἡγούμενος **F M V**: προηγούμενος **H** | βο. **F H V**: νο. **M** | πλά. $\overline{\theta}$ $\overline{\lambda}$ **F H V**: $\overline{\delta}$ $\overline{\lambda}$ **M** || 102 βο. **F H**: νο. **M V** || 103 τοῦ **F M**: τῶν **H V** | τὸν **F M V**: τῶν **H** | νότιον **F H V**: ἡγούμενον **M** | Ἰχθὺν **F H M**: Ἰχθύων **V** | μῆκ. $\overline{\sigma\eta}$ $\overline{\iota}$ **F V**: $\overline{\sigma\zeta}$ $\overline{\nu}$ **H M** | νο. **F H M**: βο. **V** || 104 νοτίου scripsi: νώτου **H**, om. **F M V** | δύο om. **M** | βο. **F H V**: νο. **M** || 105 βορείων **F**: βορίων **H V**, βορειοτέρων **M** | καὶ om. **M** | μῆκ. $\overline{\sigma\eta}$ $\overline{\mu}$ **F V**: $\overline{\sigma\theta}$ ø **H M** || 106 ἐπόμενος **F H V**: ἡγούμενος **M** | alterum τῶν om. **H M** || 107 τοῦ **F M V**: τῶν **H** | νότιον **F V**: τοῦ νότου **H**, ἡγούμενον **M** | Ἰχθὺν **F M V**: om. **H**^{ac}, Ἰχθύος add. **H**^{pc} s.l. | τετραπλεύρου **F M V**: ὁ τετρά(πλευρος?) **H** | πλά. $\overline{\varepsilon}$ $\overline{\lambda}$ **F H M**: $\overline{\theta}$ $\overline{\lambda}$ **V** || 108 βορείου οὐραίου **F M V**: βορίου οὐρέου **H** | ἐλ. om. **M V** || 110 λίνῳ **F H M**: νότῳ **V** | τοῦ νοτίου Ἰχθύος **H M V**: τοῦ Ἰχθύος τοῦ νοτίου **F** | ἐκφανῶν **M**: ἐκφανῶν ἀστέρων **F H**, ἐκφανεστάτων **V** | πλά. $\overline{\beta}$ $\overline{\iota\varepsilon}$ scripsi: $\overline{\varepsilon}$ $\overline{\iota\varepsilon}$ **F H V**, $\overline{\delta}$ $\overline{\iota\varepsilon}$ **M** || 111 τούτῳ **F H V**: τούτων **M** | ἐπόμενος **F H V**: ἐπόμενος μέσος τούτων **M** || 112 ἔτι **F H M**: ἐπὶ **V** | τούτῳ **F H V**: τούτων **M** | τρίτος **F M V**: τῶν $\overline{\gamma}$ **H** | τῶν ἐκφανῶν om. **M** | μῆκ. $\overline{\sigma\lambda}$ $\overline{\lambda}$ **F H V**: $\overline{\sigma\lambda}$ $\overline{\iota}$ **M** | πλά. ø $\overline{\iota}$ **F H V**: $\overline{\delta}$ $\overline{\mu}$ **M** || 113 ὁ om. **V** | ἀπὸ τοῦ ἡγουμένου om. **H M V** | τῶν ἐκφανῶν om. **F H V** | μῆκ. $\overline{\sigma\lambda\gamma}$ $\overline{\nu}$ **H**: $\overline{\sigma\lambda\delta}$ $\overline{\nu}$ **F V**, $\overline{\sigma\lambda}$ $\overline{\nu}$ **M** | πλά. $\overline{\beta}$ $\overline{\kappa}$ **F V**: $\overline{\beta}$ $\overline{\mu}$ **H M** || 114 ἔτι **M**: ἐπὶ **F H V** | τούτῳ **F H V**: τούτων **M** | πέμπτος **F H M**: $\overline{\beta}$ **V** | μῆκ. $\overline{\sigma\lambda\varsigma}$ $\overline{\iota}$ **F M V**: $\overline{\sigma\lambda\varsigma}$ ø **H** || 115 βορείου **F**: βορρᾶ **H**, βαρείου **V**, om. **M** | βορειότερος **M V**: βορειώτερος **F**, βόριος **H** || 116 νοτιώτερος **F H**: νότιος **M V** | τῶν εἰρημένων ἐν τῷ λίνῳ **F V**: τοῦ εἰρημένου ἐν τῷ λίνῳ **H**, τῶν ἐν τῷ εἰρημένῳ λίνῳ **M** | τοῦ βορείου Ἰχθύος om. **H M V** | μῆκ. $\overline{\sigma\lambda\eta}$ ø **F H V**: $\overline{\sigma\lambda\zeta}$ $\overline{\kappa}$ **M** | νο. **H V**: βο. **F M** | μέγ. δ΄ **F H V**: β΄ **M** || 117 τοῦ λίνου καὶ om. **F M V** | βορείου **F M V**: βορᾶ **H** | βο. **H M V**: νο. **F** | πλά. $\overline{\theta}$ ø **F H V**: $\overline{\theta}$ $\overline{\iota\varepsilon}$ **M** || 118 alterum τοῦ om. **V** | λαμπρός ad l. 119 pertinentem hic add. **F M** | stellae positionem om. **F** || 119 stellae nomen om. **F M** | ἐπ᾽ αὐτοῦ τοῦ **H**: ἐπὶ τοῦ **V** | λαμπρός om. **V** | huius stellae positionem ad l. 118 adtribuit **F**, ad l. 120 **M** | μῆκ. $\overline{\sigma\mu}$ ø **F H V**: $\overline{\mu}$ ø **M** | μέγ. γ΄ **F M V**: δ΄ **H** || 120-122 positiones stellarum falsas exhibet **M**, unicuique stellae positionem antecedentis tribuens || 120 titulum Κριοῦ **F H M**: [Κ]ριός **V** | τῶν **F M V**: τὸ **H** | κεφαλῇ **F M V**: κεφαλῖ **H** | ἡγούμενος **F M V**: προηγούμενος **H** | πλά. $\overline{\zeta}$ $\overline{\kappa}$ **F H V**: $\overline{\zeta}$ $\overline{\lambda}$ **M** || 121 τοῦ ὑπὸ **F H M**: τῶν ὑπὸ **V** | ῥομβοειδοῦς **F M V**: ῥομβοιδοῦς **H** | τετραπλεύρου scripsi: καὶ **M**, om. **F H V** | ἐπὶ τῆς κεφαλῆς **F M V**: ἐν τῇ κεφαλῇ **H** | μῆκ. $\overline{\sigma\mu\varepsilon}$ $\overline{\iota}$ **F V**: $\overline{\sigma\mu\varepsilon}$ $\overline{\nu}$ **M**, $\overline{\sigma\mu\delta}$ $\overline{\nu}$ **H** | νο. **F H V**: βο. **M** || 122 τῶν τριῶν τῶν ἐν τῇ κεφαλῇ τοῦ Κριοῦ **F H**: τῶν ἐν τῇ κεφαλῇ

τοῦ Κριοῦ $\overline{\gamma}$ **V**, τῶν ἐν τῇ κεφαλῇ τοῦ Κριοῦ **M** | stellae positione om. **M** | πλά. $\overline{\eta}$ $\overline{\kappa}$ **F V**: $\overline{\eta}$ $\overline{\lambda}$ **H** | μέγ. γ΄ **F V**: δ΄ **H** || 123 τριῶν **F H V**: τριῶν τοῦ αὐτοῦ **M** | με. om. **M V** || 124 τετραπλεύρου **F H**: απλει **V**, om. **M** | ὁ om. **M** | μετὰ τὸν ἡγούμενον **F M V**: μετ᾽ αὐτὴν ἡγούμενος **H** || 125 καὶ ἐπὶ **H**, om. **F M V** | σκέλους **F H V**: σκιέλους **M** | τοῦ Κριοῦ om. **M** | με. om. **M** || 126 ῥομβοειδεῖ **F M**: ῥομβοειδῖ **H**, ῥομβοιδῖ **V** | πλά. $\overline{\zeta}$ $\overline{\mu\varepsilon}$ **F M V**: $\overline{\zeta}$ $\overline{\varepsilon}$ **H** || 127 ἐν τῇ οὐρᾷ **H M V**: ἐπὶ τῆς οὐρᾶς **F** | τριῶν om. **H** | προηγούμενος **F H V**: ἡγούμενος **M** || 128 ἀποτομῇ **F H M**: $\overline{\alpha}$ τομῇ **V** | νοτιώτατος scripsi: νοτιώτερος **M V**, νοτιότερος **H F** || 129 ὁ om. **F H V** | ἀπὸ **F H M**: διὰ **V** | νοτιωτάτου **M V**: νοτιοτάτου ὁ δεύτερος **H**, νοτίου ὁ $\overline{\beta}$ **F** || 130 προειρημένων **V**: προειρημένων $\overline{\beta}$ **H**, προηγουμένων **F**, εἰρημένων **M** | ἐν τῇ οὐρᾷ **H M V**: ἐπὶ τῆς οὐρᾶς **F** | τριῶν ὁ μέσος **F H**: ὁ μέσος **V**, ὁ μέσος τῶν $\overline{\gamma}$ **M** || 131 τεσσάρων **H M**: $\overline{\gamma}$ **F V** | ἀπὸ om. **F V** | δεύτερος **F H V**: ἡγούμενος **M** | βορειοτάτου **H M**: βορειοτέρου **V**, βορειωτέρου **F** || 132 βορειότατος scripsi: βοριότατος **H**, βορειότερος **M V**, βορειώτερος **F** || 133 ὁ **F M V**: τὸ **H** | ἑπόμενος **F H V**: ἡγούμενος **M** || 134 Πλειάδος **M V**: Πλιάδος **F H** | βόρειον **F M V**: βορρᾶ **H** | τῆς ἡγουμένης πλευρᾶς **F V**^{pc}: τῆς ἡγομένης πλαυρᾶς **V**^{ac}, τοῦ ἡγουμένου πλευροῦ **H M** | μῆκ. $\overline{\sigma\xi\theta}$ $\overline{\mu}$ **F M V**: $\overline{\sigma\xi\theta}$ $\overline{\lambda}$ **H** || 135 νότιον **F V**: νότου **H**, νοτιώτατον **M** | τῆς ἡγουμένης πλευρᾶς **F M V**: τοῦ ἡγουμένου πλευροῦ **H** | τῆς Πλειάδος **V**: τῆς Πλιάδος **F H**, om. **M** | πλά. $\overline{\gamma}$ $\overline{\mu}$ **M V**: $\overline{\gamma}$ $\overline{\kappa}$ **F H** || 136 τὸ μέσον **H M**: τὸν μέσον **V**, τῶν μέσων **F** | Πλειάδος **M V**: Πλιάδος **F H** | τῆς ἡγουμένης πλευρᾶς **F M V**: τοῦ ἡγουμένου πλευροῦ **H** | μῆκ. $\overline{\sigma\overline{\sigma}}$ $\overline{\lambda}$ **F H V**: $\overline{\sigma\sigma\alpha}$ $\overline{\iota}$ **M** | πλά. $\overline{\delta}$ ø **F H V**: $\overline{\delta}$ $\overline{\kappa}$ **M** || 137 στενότατον μέρος **F V**: στενώτερον μέρος **M**, στενότερον πέρας **H** | Πλειάδος **M V**: Πλιάδος **F H** | μῆκ. $\overline{\sigma\sigma\alpha}$ $\overline{\iota}$ **F H M**: $\overline{\sigma\sigma\alpha}$ $\overline{\lambda}$ **V** || 138 στήθει **M H**^{pc}: στήθι **F H**^{ac} **V** | μῆκ. $\overline{\sigma\sigma\alpha}$ $\overline{\iota}$ **F H V**: $\overline{\sigma\sigma\alpha}$ $\overline{\nu}$ **M** || 139 ἀπ᾽ ἄρκτων **M**: ἀπὸ ἄρκτων **F H V** | Πλειάδος **M V**: Πλιάδος **F**, Πληάδος **H** | μῆκ. $\overline{\sigma\sigma\alpha}$ $\overline{\iota}$ scripsi ex *Alm.* 2.90.5: $\overline{\sigma\sigma\delta}$ $\overline{\iota}$ **F H V**: $\overline{\sigma\sigma\delta}$ $\overline{\nu}$ **M** | πλά. $\overline{\varepsilon}$ ø **F H V**: $\overline{\varepsilon}$ $\overline{\lambda}$ **M** || 140 τοῦ Ταύρου om. **F M V** | μέγ. γ΄ **F H V**: δ΄ **M** | ἐλ. om. **F M V** || 141 ἐπὶ τῶν ὀφθαλμῶν **M**: ὁ ἐπὶ τῶν ὀφθαλμῶν **F V**, ἐν τῷ ὀφθαλμῷ **H** | βορειότερος **F V**: βοριότερος **H**, βόρειος **M** | πλά. $\overline{\delta}$ $\overline{\iota\varepsilon}$ **H M**: $\overline{\lambda}$ $\overline{\iota\varepsilon}$ **F V** | ἐλ. om. **F M V** || 142 νοτιώτερος **M V**: νοτιότερος **F H** | τῶν δύο τῶν εἰρημένων **F V**: τῶν δύο εἰρημένων **M**, τῶν εἰρημένων δύο **H** | μῆκ. $\overline{\sigma\sigma\eta}$ $\overline{\kappa}$ **F H V**: $\overline{\sigma\sigma\eta}$ ø **M** | ἐλ. om. **F M V** || 143 βορειότερος **F M V**: βόριος **H** | huic stellae falsum cognomen add. codd. praeter **M**: καλούμενος λαμπρός **H**, καλούμενος Μάχαιρα Σαμαρίας ἄμαυρος **F**, καλούμενος Μάχαιρα Σαμαραίας **V**, fortasse cognomen astrologicum Λαμπαύραν usurpantes, quod vere ad stellam l. 145 spectat | μῆκ. $\overline{\sigma o\theta}$ $\overline{\kappa}$ **F H V**: $\overline{\sigma o\theta}$ ø **M** | πλά. $\overline{\gamma}$ ø **F M V**: $\overline{\gamma}$ $\overline{\beta}$ **H** | ἐλ. om. **F M V** || 144 ἐπὶ **F M V**: ἐκ **H** | ἑπομένου **F M V**: ἑπομένου ἀριστεροῦ **H** | μῆκ. $\overline{\sigma o\theta}$ $\overline{\mu}$ **F H V**: $\overline{\sigma\overline{\sigma}}$ $\overline{\mu}$ **M** | πλά. $\overline{\iota}$ ø **F H V**: $\overline{\varepsilon}$ ø **M** | μέγ. δ΄ **F H V**: γ΄ **M** || 145 τῇ Ὑάδι **H V**: ταῖς Ὑάσι **M**, ταῖς Ὑάσι καὶ **F** | Λαμπρός **F H V**: Λαμπαύρας **M** | μῆκ. $\overline{\sigma\pi}$ $\overline{\iota}$ **M V**^{pc}: $\overline{\sigma\pi\gamma}$ $\overline{\iota}$ **F H V**^{ac} | πλά. $\overline{\varepsilon}$ $\overline{\iota}$ **F M V**: $\overline{\varepsilon}$ ø **H** | μέγ. α΄ **M V**^{pc}: δ΄ **F H** fort. **V**^{ac} || 146 τοῦ Ταύρου om. **F V** | πλά. ø $\overline{\iota\varepsilon}$ **F H**: $\overline{\theta}$ $\overline{\iota\varepsilon}$ **V** || 147 τοῦ Ταύρου om. **F M V** | πλά. ø $\overline{\iota\varepsilon}$ **F H**: $\overline{\theta}$ $\overline{\iota\varepsilon}$ **V**, $\overline{\varepsilon}$ $\overline{\iota\varepsilon}$ **M** || 148 δορᾷ τοῦ Ὡρίωνος **H**: δορᾷ τῶν Ὡρίωνος **M**, οὐρᾷ τοῦ Ταύρου **F V** | δύο om. **F V** | συνεχῶν **F H V**: συνεχῶν καὶ βορείων **M** | ὁ ἡγούμενος **F M V**: ὁ βόρειος **H** | πλά. $\overline{\eta}$ $\overline{\iota}$ **F H**: $\overline{\varepsilon}$ $\overline{\iota}$ **V**, $\overline{\eta}$ ø **M** || 150 ἐπ᾽ ἄκρου **H M**: ἐπ᾽ ἄκρας **F V** | βορείου **F M V**: βορρᾶ **H** | βο. **H V**: νο. **F M** | πλά. $\overline{\varepsilon}$ ø **F M V**: ø ø **H** | μέγ. γ΄ **F M V**: γ΄ με. **H** || 151 ἄκρου **H M**: ἄκρας **F V** | μῆκ. $\overline{\sigma\varrho\varepsilon}$ $\overline{\iota}$ **F H V**: $\overline{\sigma\varrho\theta}$ $\overline{\iota}$ **M** | νο. **F H M**: βο. **V** | πλά. $\overline{\beta}$ $\overline{\iota}$ **F H**: $\overline{\beta}$ ø **M**, $\overline{\varepsilon}$ ø **V** | με. add. **H** || 152 titulum ad l. 155 exhibet **V** | Πρόποδος τοῦ ἡγουμένου Διδύμου **M**: ποδὸς τῶν Διδύμων **F H V** || 153 λαβῇ **F M V**: χειρὶ **H** | Ὡρίωνος **F H M**: Οὐρίωνος **V** | δύο om. **F H** | μῆκ. $\overline{\tau\gamma}$ $\overline{\lambda}$ **F H M V**^{pc}: $\overline{\tau\gamma}$ $\overline{\iota}$ **V**^{ac} | πλά. $\overline{\theta}$ $\overline{\mu\varepsilon}$ **F H V**^{pc}: $\overline{\varepsilon}$ $\overline{\mu\varepsilon}$ **M**, $\overline{\varepsilon}$ ø **V**^{ac} || 154 εἰρημένων **M V**: προειρημένων **F H** | ἐκφανῶν **F V**: ἐκφάσεων τοῦ Ὡρίωνος **H**, om. **M** | νο. **F H M**: βο. **V** | με. om. **M** || 155 ὡς ἐπ᾽ εὐθείας αὐτῶν **V**: ὡς ἐπ᾽ εὐθείας αὐτοῦ $\overline{\beta}$ ὁ ἡγούμενος **H**, om. **F M** | βο. **H**: νο. **F M V** | πλά. $\overline{\varepsilon}$ $\overline{\nu}$ **H**: $\overline{\varepsilon}$ $\overline{\lambda}$ **M**, $\overline{\gamma}$ $\overline{\lambda}$ **V**, $\overline{\iota\gamma}$ $\overline{\lambda}$ **F** | με. om. **M** || 156 om. **V** | τοῦ ἡγουμένου Διδύμου **M**: ἡγουμένων Διδύμων **H**, τῶν ἡγουμένων **F** | ὁ om. **F** | με. om. **F M** || 157 Ποὺς **F H V**: Πρόπους **M** | πλά. $\overline{\alpha}$ $\overline{\iota\varepsilon}$ **F H V**: $\overline{\alpha}$ $\overline{\iota}$ **M** | με. om. **M** || 158 τούτου **F H V**: τούτων **H** | καὶ **F H M**: ὁ **V** | δευτέρου **F H V**: δεξιοῦ **M** | τοῦ δεξιοῦ Διδύμου scripsi: τοῦ δεξιοῦ **F V**, τοῦ Διδύμου **H**, om. **M** | με. om. **M** || 159 ἔτι scripsi: ἐπὶ **F H V**, om. **M** | νοτιώτερος **H M V**: νότιος **F** | καὶ **F H**: ὁ **V**, om. **M** | ἐπὶ τοῦ τρίτου ποδὸς ἐκφανής **F H V**: ἐκφανής ἐπὶ τοῦ τρίτου ποδὸς **M** | μῆκ. $\overline{\tau\theta}$ $\overline{\lambda}$ **F V**: $\overline{\tau\theta}$ $\overline{\kappa}$ **H M** | νο. **F H V**: βο. **M** | μέγ. γ΄ **F H V**: δ΄ **M** || 160 ὡς ἐπ᾽ εὐθείας om. **F V** | τριῶν om. **F H** || 161 πήχει **F M V**: πήχι **H** | πλά. $\overline{\iota}$ ø **F H V**: $\overline{\alpha}$ $\overline{\iota}$ **M** || 162 εἰρημένων **F V**: ἡγουμένων **H M** | ἐν om. **H** | γόνασι **F H M**: γόνασιν **V** | τῶν Διδύμων om. **F M V** | μέσος **F H V**: ἡγούμενος **M** | πλά. $\overline{\beta}$ $\overline{\lambda}$ **F H M**: $\overline{\beta}$ $\overline{\lambda\gamma}$ **V** || 163 ὤμοις **F M V**: ὠμοπλάταις **H** || 164 Ἵππαρχος καλεῖ Ὀμφαλόν **F H M**: Ἵπαρχος Ὀμφαλὸν καλεῖ **V** | νο. **H M**: βο. **F V** | πλά. ø $\overline{\lambda}$ **F H V**: $\overline{\theta}$ $\overline{\lambda}$ **M** | μέγ. γ΄ **F H V**: δ΄ **M** || 165 τῶν **F V**: τῷ **M**, om. **H** | τῶν Διδύμων om. **F** | τριῶν om. **H M V** | νο. **F H**: βο. **M V** || 166 ὤμοις **F M V**: γόνασι **H** | τῶν Διδύμων om. **M** | ὁ om. **V** | μετὰ τὸν ἡγούμενον **F M V**: μέσως τοῦ ἡγουμένου **H** | βο. **F H V**: νο. **M** || 167 ἐπὶ **F M V**: ἐκ **H** | πλα. $\overline{\theta}$ $\overline{\mu}$ **F H V**: $\overline{\theta}$ $\overline{\mu\varepsilon}$ **M** || 168 ὑπ᾽ αὐτὸν **F M**: ὑπ᾽ αὐτῶν **V**, ἐπ᾽ αὐτοῦ **H** | τρίτος **F V**: ἑπόμενος **H M** | ἐν τοῖς ὤμοις **F H V**: ἐν τοῖς ὤμοις $\overline{\gamma}$ **M** || 169 ὤμοις **F M V**: ὠμὰ **H** | μῆκ. $\overline{\tau\kappa\delta}$ $\overline{\iota}$ **F M V**: $\overline{\tau\kappa\delta}$ $\overline{\lambda}$ **H** | πλά. $\overline{\beta}$ $\overline{\mu}$ **F H**: $\overline{\varepsilon}$ $\overline{\mu}$ **V**, $\overline{\gamma}$

$\overline{\mu\varepsilon}$ **M** || 170 ἐπὶ **F M V**: ἐκ **H** | ἐπομένου **F H V**: ἡγουμένου **M** | μῆκ. $\overline{\tau\kappa\delta}$ $\bar{\iota}$ **F M V**: $\overline{\tau\kappa\delta}$ $\bar{\lambda}$ **H** | πλά. $\bar{\varsigma}$ $\overline{\iota\varepsilon}$ **F H**: $\bar{\varsigma}$ $\bar{\varepsilon}$ **V** || 171 τῇ χειρὶ **F M V**: τῶν ἐν τῇ χειρὶ **H** | μῆκ. $\overline{\tau\kappa\eta}$ $\bar{\iota}$ **F M V**: $\overline{\tau\kappa\eta}$ $\overline{\iota\varepsilon}$ **H** | με. om. **M V** || 172 ἔτι **H M**: ἐπὶ **F V** | τούτῳ **H**: τούτου **F M**, τοῦ **V** | μῆκ. $\overline{\tau\lambda\delta}$ $\bar{\mu}$ **F M V**: $\overline{\tau\lambda\delta}$ $\bar{\lambda}$ **H** | νο. **F H V**: βο. **M** | με. om. **M** || 173 titulum Καρκίνου ad l. 175 exhibet **M** | δύο τοῦ νεφελίου **H M**: δύο τῶν νεφελίου **F**, τοῦ νεφελίου δύο **V** | <τοῦ> Καρκίνου scripsi: Καρκίνου **H**, om. **F M V** | βορειότερος **M V**: βορειώτερος **F**, βοριότερος **H** | βο. **F H V**: νο. **M** | ἐλ. om. **M V** || 174 νοτιώτερος **F M V**: νοτιότερος **H** | τῶν δύο τῶν εἰρημένων **F V**: τῶν εἰρημένων δύο **H M** | μῆκ. $\overline{\tau\lambda\varepsilon}$ $\bar{\lambda}$ **F H M**: $\overline{\tau\lambda\varepsilon}$ $\bar{\delta}$ **V** | ἐλ. om. **M V** || 175 ὁ μέσος **H M**: τὸ μέσον **F V** | ἐν τῷ μέσῳ **M**: ἐν μέσῳ **F H**, ἐμμέσῳ **V** | καλούμενος Φάτνη om. **H M** | πλά. ø $\bar{\mu}$ **F H M**: ø $\bar{\eta}$ **V** | μέγ. νεφ. **F H V**: δ΄ **M** || 176 τοῦ νεφελίου scripsi: τῷ νεφελίῳ **M**, τοῦ ἑν νεφέλης **H**, τοῦ τετραπλεύρου **F V** | βορειότερος **H**^{pc} **M**: βορειώτερος **F**, βοριότερος **V**, βορειότατος **H**^{ac} | μῆκ. $\overline{\tau\lambda\zeta}$ $\bar{\nu}$ **F H V**: $\overline{\tau\lambda\zeta}$ ø **M** | βο. **F H V**: νο. **M** | πλά. $\bar{\beta}$ $\bar{\mu}$ **H**: $\bar{\beta}$ $\bar{\eta}$ **F V**, $\bar{\beta}$ $\bar{\lambda}$ **M** | με. om. **M** || inter ll. 176 et 177 stellam add. **F**, nomine stellae l. 179 usus, positione vero stellae l. 176 || 177 νοτιώτερος **F H**: νότιος **M V** | ὄνων **H V**: ὄνων ὤμων **F**, εἰρημένων **M** | μῆκ. $\overline{\tau\lambda\eta}$ $\bar{\nu}$ **H M V**: $\overline{\tau\lambda\eta}$ $\bar{\lambda}$ **F** | με. om. **M V** || 178 νοτίου **M**: νοτίας **F H V** | πλά. $\bar{\beta}$ $\bar{\kappa}$ **F H V**: $\bar{\beta}$ $\bar{\mu}$ **M** | με. om. **M V** || 179-186 deest **V** || 179 νοτίου **M**: νοτίας **F H** || 180 πλά. $\overline{\tau\mu\varepsilon}$ $\bar{\nu}$ **F H**: $\overline{\tau\mu\varepsilon}$ $\bar{\iota}$ **M** || 181 πλά. $\overline{\tau\mu\eta}$ $\bar{\mu}$ **F H**: $\overline{\tau\mu\eta}$ $\bar{\nu}$ **M** || 182 τῷ **F**: τῶν **H M** | τῆς om. **F** | νοτίου **M**: νοτίας **F H** | χηλῆς **F M**: χιλῆς **H** | ἐλ. om. **M** || 183 τῇ κεφαλῇ **F M**: τῖ κεφαλῖ **H** | νοτιώτερος **H**: νοτιότερος **F**, νότιος **M** | μέγ. γ΄ **F H**: δ΄ **M** | με. om. **M** || 184 με. om. **M** || 185 τραχήλῳ **F M**: τραχίλῳ **H** | νοτιώτατος scripsi: νοτιώτερος **H M**, νοτιότερος **F** | μῆκ. $\overline{\tau\nu\eta}$ $\bar{\iota}$ **F H**: $\overline{\tau\nu\delta}$ $\bar{\iota}$ **M** || 186 τραχήλῳ **F M**: τραχίλῳ **H** | τοῦ Λέοντος om. **F M** | τριῶν om. **H** ||

Comparison between A20 and the star catalogue of *Almagest* 7-8

	A 20			*Almagest*			
	name	position	magn.	page and line of Heiberg	name	position	magn.
1	ὁ ἐπὶ τῆς καρδίας τοῦ Λέοντος	0° 0’, 0° 10’ N	I	98-99.6	ὁ ἐπὶ τῆς καρδίας καλούμενος Βασιλίσκος	Leo 2° 30’, 0° 10’ N	I
2	ὁ ἐπὶ τοῦ ἡγουμένου γόνατος τοῦ Λέοντος	0° 0’, 4° 15’ S	IV	98-99.12	ὁ ἐπὶ τοῦ ἀριστεροῦ γόνατος	Leo 2° 30’, 4° 15’ S	IV
3	ὁ νοτιώτερος τοῦ ἐπὶ τῆς καρδίας τοῦ Λέοντος καὶ <ὡς ἐπὶ> τοῦ στήθους	1° 0’, 1° 50’ S	IV	98-99.7	ὁ νοτιώτερος αὐτοῦ (i.e. no. 1) καὶ ὡς ἐπὶ τοῦ στήθους	Leo 3° 30’, 1° 50’ S	IV
4	ὁ ἐπὶ τῆς μασχάλης τοῦ Λέοντος, ὃν Ἵππαρχος καλεῖ ἐπὶ τῆς γαστρὸς τοῦ Λέοντος	6° 40’, 0° 10’ S	IV	98-99.13	ὁ ἐπὶ τῆς ἀριστερᾶς μασχάλης	Leo 9° 10’, 0° 10’ S	IV
5	ὁ ἐπὶ τοῦ γλουτοῦ τοῦ Λέοντος λαμπρός	13° 50’, 9° 20’ N	III	100-101.2	ὁ νοτιώτερος αὐτῶν (i.e. τῶν ἐν τοῖς γλουτοῖς $\bar{\beta}$)	Leo 16° 20’, 9° 40’ N	III
6	ὁ προηγούμενος τῶν ὀπισθίων μηρῶν τοῦ Λέοντος	15° 0’, 1° 10’ N	IV -	100-101.12	τῶν ὑπὸ τὴν λαγόνα $\bar{\gamma}$ ὁ βόρειος	Leo 17°30’, 1° 10’ N	IV -
7	ὁ ἐπὶ τῶν ὀπισθίων μηρῶν τοῦ Λέοντος	17° 50’, 5° 50’ N	III	100-101.3	ὁ ἐν τοῖς ὀπισθομήροις	Leo 20° 20’, 5° 50’ N	III
8	ὁ κατὰ τῶν ἑπομένων γονάτων τοῦ Λέοντος	19° 10’, 1° 15’ N	IV	100-101.4	ὁ ἐν ταῖς ὀπισθίαις ἀγκύλαις	Leo 21° 40’, 1° 15’ N	IV

9	ὁ ἐπὶ τῆς κνήμης τοῦ Λέοντος, ὃν Ἵππαρχος καλεῖ ὀπίσθιον πόδα	22° 10′, 0° 50′ S	IV	100-101.5	ὁ τούτου νοτιώτερος ὡς ἐν τοῖς πήχεσι	Leo 24° 40′, 0° 50′ S	IV
10	ὁ ἐπ᾽ ἄκρας τῆς νοτίου πτέρυγος τῆς Παρθένου	26° 30′, 0° 10′ N	III	102-103.7	ὁ ἐπ᾽ ἄκρας τῆς νοτίου καὶ ἀριστερᾶς πτέρυγος	Leo 29° 0′, 0° 20′ N	III
11	ὁ ἑπόμενος αὐτοῦ καὶ νοτίου πτέρυγος δεύτερος	35° 45′, 1° 10′ N	III	102-103.8	τῶν ἐν τῇ ἀριστερᾷ πτέρυγι δ̄ ὁ προηγούμενος	Vir 8° 15′, 1° 30′ N	III
12	ὁ ἔτι τούτῳ ἑπόμενος, ὃν Ἵππαρχος καλεῖ νότιον ὦμον	40° 40′, 2° 50′ N	III	102-103.9	ὁ τούτῳ ἑπόμενος	Vir 13° 10′, 2° 50′ N	III
13	ὁ ἐν τῷ βορείῳ πλευρῷ, ὃν Ἵππαρχος καλεῖ βόρειον ὦμον	41° 50′, 8° 15′ N	III	102-103.12	ὁ ἐν τῷ δεξιῷ πλευρῷ ὑπὸ τὴν ζώνην	Vir 14° 20′, 8° 30′ N	III
14	ὁ ἑπόμενος καὶ τέταρτος τῶν ἀπὸ τοῦ ἐπ᾽ ἄκρας τῆς νοτίου πτέρυγος τῆς Παρθένου	48° 30′, 1° 30′ N	IV	102-103.11	ὁ ἔσχατος καὶ ἑπόμενος τῶν δ̄	Vir 21° 0′, 1° 40′ N	IV
15	ὁ ἐπὶ τοῦ βορείου γλουτοῦ, ὃν Ἵππαρχος καλεῖ δεξιὸν ἀκρόχειρον	52° 20′, 8° 40′ N	III	102-103.17	ὁ ὑπὸ τὸ περίζωμα ὡς κατὰ τοῦ δεξιοῦ γλουτοῦ	Vir 24° 50′, 8° 40′ N	III
16	ὁ ἐπὶ τοῦ Στάχυος τῆς Παρθένου λαμπρός	54° 10′, 2° 0′ S	I	102-103.16	ὁ ἐπὶ τοῦ ἀριστεροῦ ἀκροχείρου ὁ καλούμενος Στάχυς Παρθένου	Vir 26° 40′, 2° 0′ S	I
17	τοῦ βορειοτέρου <τοῦ> Στάχυος τετραπλεύρου ὁ ἑπόμενος	57° 30′, 1° 30′ N	IV	104-105.3	τῆς ἑπομένης πλευρᾶς (scil. τοῦ ἐν τῷ ἀριστερῷ μηρῷ τετραπλεύρου) τῶν β̄ ὁ βορειότερος	Lib 0° 0′, 1° 30′ N	IV -
18	τῶν ἐν τῷ σύρματι τῆς Παρθένου τριῶν ὁ μέσος	64° 10′, 7° 30′ N	IV	104-105.7	τῶν ἐν τῷ περιποδίῳ σύρματι γ̄ ὁ μέσος	Lib 6° 40′, 7° 10′ N	IV
19	ὁ νοτιώτερος τῶν ἐν τῷ σύρματι τριῶν	64° 50′, 2° 40′ N	IV	104-105.8	ὁ νότιος αὐτῶν (i.e. τῶν ἐν τῷ περιποδίῳ σύρματι γ̄)	Lib 7° 20′, 2° 40′ N	IV
20	ὁ ἐπὶ τοῦ νοτίου ποδὸς τῆς Παρθένου	67° 20′, 0° 30′ N	IV	104-105.10	ὁ ἐπὶ τοῦ ἀριστεροῦ καὶ νοτίου ἀκρόποδος	Lib 10° 0′, 0° 30′ N	IV
21	ὁ ἐπὶ τοῦ βορείου ποδὸς τῆς Παρθένου	70° 10′, 9° 50′ N	IV	104-105.11	ὁ ἐπὶ τοῦ δεξιοῦ καὶ βορείου ἀκρόποδος	Lib 12° 40′, 9° 50′ N	IV
22	ὁ ἐπ᾽ ἄκρας τῆς νοτίου Χηλῆς τοῦ Σκορπίου λαμπρός	75° 30′, 0° 40′ N	II	106-107.4	τῶν ἐπ᾽ ἄκρας τῆς νοτίου χηλῆς ὁ λαμπρός	Lib 18° 0′, 0° 40′ N	II
23	ὁ ἑπόμενος αὐτῷ καὶ ἐπὶ τῆς αὐτῆς Χηλῆς	78° 50′, 1° 15′ N	IV	108-109.2	ὁ τούτου (i.e. no. 26) προηγούμενος ἐπὶ τῆς αὐτῆς χηλῆς	Lib 21° 20′, 1° 15′ N	IV
24	ὁ ἐπ᾽ ἄκρας τῆς βορείου Χηλῆς τοῦ Σκορπίου λαμπρός	79° 40′, 8° 50′ N	II	106-107.6	τῶν ἐπ᾽ ἄκρας τῆς βορείου χηλῆς ὁ λαμπρός	Lib 22° 10′, 8° 50′ N	II
25	ὁ ἀπὸ μεσημβρίας τῶν Χηλῶν ἐκφανής	80° 30′, 7° 30′ S	III	108-109.13	τῶν νοτιωτέρων τῆς νοτίου χηλῆς γ̄ ὁ προηγούμενος	Lib 23° 0′, 7° 30′ S	III
26	ὁ ἐν μέσῃ τῇ νοτίῳ Χηλῇ τοῦ Σκορπίου	81° 30′, 1° 40′ S	IV	106-107.8	ὁ ἐν μέσῃ τῇ νοτίῳ χηλῇ	Lib 24° 0′, 1° 40′ S	IV
27	ὁ ἐν μέσῃ τῇ βορείῳ Χηλῇ τοῦ Σκορπίου	85° 20′, 4° 45′ N	IV	108-109.3	ὁ ἐν μέσῃ τῇ βορείῳ χηλῇ	Lib 27° 50′, 4° 45′ N	IV

28	ὁ μεταξὺ τῶν Χηλῶν τοῦ Σκορπίου	88° 40′, 1° 30′ S	IV	108-109.12	ὁ νότιος αὐτῶν (i.e. τῶν μεταξὺ τῶν χηλῶν γ̄)	Sco 1° 10′, 1° 30′ S	IV
29	τῶν ἑπομένων δύο τῆς νοτίου Χηλῆς ἐκφανῶν ὁ βορειότερος	88° 40′, 8° 10′ S	IV -	108-109.14	τῶν λοιπῶν καὶ ἑπομένων β̄ (scil. τῶν νοτιωτέρων τῆς νοτίου χηλῆς γ̄) ὁ βορειότερος	Sco 1° 10′, 8° 30′ S	IV
30	ὁ νοτιώτερος αὐτῶν	89° 30′, 9° 40′ S	IV -	108-109.15	ὁ νοτιώτερος αὐτῶν	Sco 2° 0′, 9° 40′ S	IV
31	ὁ ἐπὶ τῆς ἐκφύσεως τῆς βορείου Χηλῆς τοῦ Σκορπίου	90° 30′, 3° 30′ N	IV -	108-109.4	ὁ ἑπόμενος αὐτῷ (i.e. no. 27) ἐπὶ τῆς αὐτῆς χηλῆς	Sco 3° 0′, 3° 30′ N	IV -
32	ὁ βορειότερος αὐτοῦ	90° 40′, 6° 40′ N	IV -	108-109.8	τῶν ἑπομένων β̄ (scil. τῶν βορειοτέρων τῆς βορείου χηλῆς γ̄) ὁ νοτιώτερος	Sco 3° 40′, 6° 40′ N	IV -
33	τῶν ἀπ᾽ ἄρκτου τῆς βορείου Χηλῆς τοῦ Σκορπίου ὁ βορειότατος	91° 50′, 9° 15′ N	IV -	108-109.9	ὁ βόρειος αὐτῶν	Sco 4° 20′, 9° 15′ N	IV -
34	τῶν ἐν τῷ μετώπῳ τοῦ Σκορπίου ὁ δεύτερος ἀπὸ τοῦ βορειοτάτου	93° 10′, 1° 40′ S	III	108-109.19	ὁ μέσος αὐτῶν (i.e. τῶν ἐν τῷ μετώπῳ λαμπρῶν γ̄)	Sco 5° 40′, 1° 40′ S	III
35	ὁ τρίτος ἀπὸ τοῦ βορειοτάτου τῶν ἐν τῷ μετώπῳ τοῦ Σκορπίου	93° 10′, 5° 0′ S	III	110-111.2	ὁ νοτιώτερος τῶν τριῶν	Sco 5° 40′, 5° 0′ S	III
36	ὁ ἔτι νοτιώτερος καὶ τέταρτος ἀπὸ τοῦ βορειοτάτου	93° 30′, 7° 50′ S	III	110-111.3	ὁ τούτου ἔτι νοτιώτερος ἐφ᾽ ἑνὸς τῶν ποδῶν	Sco 6° 0′, 7° 50′ S	III
37	ὁ βορειότατος τῶν ἐν τῷ μετόπῳ τοῦ Σκορπίου	93° 50′, 1° 20′ N	III	108-109.18	τῶν ἐν τῷ μετώπῳ λαμπρῶν γ̄ ὁ βόρειος	Sco 6° 20′, 1° 20′ N	III
38	τῶν παρακειμένων δύο τῷ βορειοτάτῳ ὁ νοτιώτερος	93° 50′, 0° 30′ N	IV	110-111.5	ὁ νότιος αὐτῶν (i.e. τῶν β̄ τῶν παρακειμένων τῷ βορειοτάτῳ τῶν λαμπρῶν)	Sco 6° 20′, 0° 30′ N	IV
39	ὁ βορειότερος αὐτῶν	94° 30′, 1° 40′ N	IV	110-111.4	τῶν β̄ τῶν παρακειμένων τῷ βορειοτάτῳ τῶν λαμπρῶν ὁ βόρειος	Sco 7° 0′, 1° 40′ N	IV
40	ὁ ἐπὶ τοῦ ἡγουμένου ποδὸς τοῦ Ὀφιούχου	98° 10′, 0° 45′ S	IV	70-71.3	ὁ τοῦ κοίλου τοῦ ἀριστεροῦ ποδὸς ἁπτόμενος	Sco 10° 40′, 0° 45′ S	IV
41	τῶν ἐν τῷ στήθει τοῦ Σκορπίου τριῶν λαμπρῶν ὁ ἡγούμενος	98° 10′, 3° 45′ S	III	110-111.6	τῶν ἐν τῷ σώματι γ̄ λαμπρῶν ὁ προηγούμενος	Sco 10° 40′, 3° 45′ S	III
42	ὁ μέσος αὐτῶν ὑπόκιρρος, καλούμενος Ἀντάρης	100° 10′, 4° 0′ S	II	110-111.7	ὁ μέσος αὐτῶν καὶ ὑπόκιρρος καλούμενος Ἀντάρης	Sco 12° 40′, 4° 0′ S	II
43	ὁ ἑπόμενος τῶν τριῶν τῶν ἐν τῷ στήθει τοῦ Σκορπίου	102° 0′, 5° 30′ S	III	110-111.8	ὁ ἑπόμενος τῶν γ̄	Sco 14° 30′, 5° 30′ S	III
44	ὁ ἐπὶ τοῦ ἑπομένου γόνατος τοῦ Ὀφιούχου	108° 40′, 7° 30′ N	III	68-69.12	ὁ ἐπὶ τοῦ δεξιοῦ γόνατος	Sco 21° 10′, 7° 30′ N	III
45	τῶν ἐν τῷ ἑπομένῳ ποδὶ τοῦ Ὀφιούχου τριῶν ὁ προηγούμενος	110° 30′, 2° 15′ S	IV	68-69.14	τῶν ἐπὶ τοῦ δεξιοῦ ποδὸς δ̄ ὁ προηγούμενος	Sco 23° 0′, 2° 15′ S	IV

46	ὁ ἐπὶ τῆς ἑπομένης γαστροκνημίας τοῦ Ὀφιούχου	111° 10′, 2° 15′ N	IV +	68-69.13	ὁ ἐπὶ τῆς δεξιᾶς κνήμης	Sco 26° 40′, 2° 15′ N	IV +
47	τῶν ἐν τῷ ἑπομένῳ ποδὶ τοῦ Ὀφιούχου ὁ δεύτερος ἀπὸ τοῦ ἡγουμένου	111° 50′, 1° 30′ S	IV +	68-69.15	ὁ τούτῳ (i.e. no. 45) ἑπόμενος	Sco 24° 20′, 1° 30′ S	IV +
48	ὁ τούτῳ ἑπόμενος καὶ τρίτος ἀπὸ τοῦ ἡγουμένου	112° 30′, 0° 20′ S	IV +	68-69.16	ὁ ἔτι τούτῳ ἑπόμενος	Sco 25° 0′, 0° 20′ S	IV
49	τῶν ἀπ᾽ ἄρκτου δύο τοῦ κέντρου τοῦ Σκορπίου ὁ ἡγούμενος	113° 0′, 6° 10′ S	IV +	112-113.6	τῶν ἀπ᾽ ἄρκτων τοῦ κέντρου β̄ ὁ προηγούμενος	Sco 25° 30′, 6° 10′ S	V +
50	ὁ ἐπὶ τῆς ἀκίδος τοῦ βέλους τοῦ Τοξότου	122° 0′, 6° 20′ S	III	112-113.10	ὁ ἐπὶ τῆς ἀκίδος τοῦ βέλους	Sgr 4° 30′, 6° 30′ S	III
51	τῶν ἐν τῷ τόξῳ τοῦ Τοξότου ὁ βορειότατος καὶ ἐπ᾽ ἄκρου τοῦ τόξου	124° 10′, 2° 50′ N	IV	112-113.14	ὁ βορειότερος αὐτῶν (i.e. τῶν ἐν τῷ βορείῳ μέρει τοῦ τόξου) ἐπ᾽ ἄκρου τοῦ τόξου	Sgr 6° 40′, 2° 50′ N	IV
52	ὁ τρίτος ἀπὸ τοῦ βορειοτάτου καὶ κατὰ τῆς λαβῆς τοῦ Τοξότου	125° 10′, 6° 30′ S	III	112-113.11	ὁ ἐν τῇ λαβῇ τῆς ἀριστερᾶς χειρός	Sgr 7° 40′, 6° 30′ S	III
53	ὁ δεύτερος ἀπὸ τοῦ βορειοτάτου τῶν ἐν τῷ τόξῳ τοῦ Τοξότου	126° 30′, 1° 30′ S	III	112-113.13	τῶν ἐν τῷ βορείῳ μέρει τοῦ τόξου ὁ νοτιώτερος	Sgr 9° 0′, 1° 30′ S	III
54	ὁ ἡγούμενος τῶν ἐν τῇ ὠμοπλάτῃ τοῦ Τοξότου, τοῦ τετραπλεύρου	130° 30′, 3° 45′ S	IV +	112-113.16	ὁ τούτου (i.e. no. 56) προηγούμενος κατὰ τοῦ βέλους	Sgr 13° 0′, 3° 30′ S	IV
55	ὁ κατὰ τοῦ ὀφθαλμοῦ τοῦ Τοξότου νεφελοειδής	132° 40′, 0° 45′ N	neb.	112-113.17	ὁ ἐπὶ τοῦ ὀφθαλμοῦ νεφελοειδὴς καὶ διπλοῦς	Sgr 15° 10′, 0° 45′ N	neb.
56	τοῦ τετραπλεύρου τῶν δύο λαμπρῶν ἀντιγωνίων ὁ βορειότερος	132° 50′, 3° 10′ S	III	112-113.15	ὁ ἐπὶ τοῦ ἀριστεροῦ ὤμου	Sgr 15° 20′, 3° 10′ S	III
57	ὁ τούτου βορειότερος καὶ κατὰ τῆς κεφαλῆς τοῦ Τοξότου	133° 10′, 2° 10′ N	IV	112-113.18	τῶν ἐν τῇ κεφαλῇ γ̄ ὁ ἡγούμενος	Sgr 15° 40′, 2° 10′ N	IV
58	τῶν εἰρημένων δύο λαμπρῶν ἀντιγωνίων ὁ νοτιώτερος	133° 50′, 6° 45′ S	III	114-115.13	ὁ λοιπὸς (scil. τῶν ἐν τῷ νώτῳ γ̄) καὶ ὑπὸ τὴν μασχάλην	Sgr 16° 20′, 6° 45′ S	III
59	ὁ λοιπὸς καὶ ἑπόμενος τοῦ τετραπλεύρου	135° 10′, 4° 30′ S	IV	114-115.12	ὁ μέσος αὐτῶν καὶ κατὰ τῆς ὠμοπλάτης	Sgr 17° 40′, 4° 30′ S	IV +
60	ὁ μέσος τῶν ἐν τῇ κεφαλῇ τοῦ Τοξότου τριῶν	135° 10′, 1° 30′ N	IV	112-113.19	ὁ μέσος αὐτῶν (i.e. τῶν ἐν τῇ κεφαλῇ γ̄)	Sgr 17° 40′, 1° 30′ N	IV
61	ὁ ἑπόμενος τῶν τριῶν	136° 40′, 2° 0′ N	IV	114-115.2	ὁ ἑπόμενος τῶν τριῶν	Sgr 19° 10′, 2° 0′ N	IV
62	τῶν ἐν ταῖς ἐφαπτίσι τοῦ Τοξότου δύο ἐκφανῶν ὁ νοτιώτερος	139° 50′, 4° 30′ N	IV	114-115.4	ὁ μέσος αὐτῶν (i.e. τῶν ἐν τῇ βορείῳ ἐφαπτίδι γ̄)	Sgr 22° 20′, 4° 30′ N	IV
63	ὁ βορειότερος αὐτῶν	140° 20′, 6° 30′ N	IV	114-115.5	ὁ βόρειος τῶν τριῶν	Sgr 22° 50′, 6° 30′ N	IV
64	ὁ ἐπὶ τοῦ ἑπομένου ἀγκῶνος τοῦ Τοξότου	142° 20′, 2° 50′ S	IV	114-115.10	ὁ ἐπὶ τοῦ δεξιοῦ ἀγκῶνος	Sgr 24° 50′, 2° 50′ S	IV
65	τῶν ἐν τοῖς κέρασι τοῦ Αἰγόκερω δύο λαμπρῶν ὁ νοτιώτερος	154° 50′, 5° 0′ N	III	116-117.8	ὁ νότιος τῶν τριῶν (i.e. τῶν ἐν τῷ ἑπομένῳ κέρατι)	Cap 7° 20′, 5° 0′ N	III

66	ὁ βορειότερος αὐτῶν	154° 50′, 7° 20′ N	III	116-117.6	τῶν ἐν τῷ ἑπομένῳ κέρατι γ̄ ὁ βόρειος	Cap 7° 20′, 7° 20′ N	III
67	ὁ ἐπὶ τοῦ βορείου γόνατος τοῦ Αἰγόκερω	158° 20′, 6° 30′ S	IV	116-117.17	ὁ ὑπὸ τὸ δεξιὸν γονάτιον	Cap 10° 50′, 6° 30′ S	IV
68	ὁ ἐπὶ τοῦ νοτίου γόνατος τοῦ Αἰγόκερω	159° 10′, 8° 30′ S	IV	116-117.16	ὁ ἐπὶ τοῦ ἀριστεροῦ κεκαμμένου γόνατος	Cap 11° 40′, 8° 40′ S	IV
69	τῶν ἐν τῷ ἱματίῳ τοῦ Ὑδροχόου τριῶν ὁ βορειότατος	162° 10′, 8° 40′ N	III	120-121.7	ὁ προηγούμενος τῶν τριῶν (i.e. τῶν ἐν τῇ ἀριστερᾷ χειρὶ ἐπὶ τοῦ ἱματίου)	Cap 14° 40′, 8° 40′ N	III
70	ὁ μέσος τῶν τριῶν	163° 40′, 8° 0′ N	IV	120-121.6	ὁ μέσος αὐτῶν	Cap 16° 10′, 8° 0′ N	IV
71	ὁ κατὰ τῆς ὠμοπλάτης τοῦ Αἰγόκερω	164° 10′, 7° 40′ S	IV	116-117.18	ὁ ἐπὶ τοῦ ἀριστεροῦ ὤμου	Cap 16° 40′, 7° 40′ S	IV
72	τῶν ἐν τῷ νώτῳ τοῦ Αἰγόκερω δύο ὁ προηγούμενος	164° 10′, 0° 0′ S	IV	118-119.6	τῶν ἐν τῷ νώτῳ β̄ ὁ προηγούμενος	Cap 16° 40′, 0° 0′ S	IV
73	τῶν ἐν τῷ ἱματίῳ τοῦ Ὑδροχόου τριῶν ὁ νοτιώτατος	165° 10′, 5° 30′ N	III	120-121.5	τῶν ἐν τῇ ἀριστερᾷ χειρὶ ἐπὶ τοῦ ἱματίου γ̄ ὁ ἑπόμενος	Cap 17° 40′, 5° 30′ N	III
74	τῶν ὑπὸ τὴν κοιλίαν τοῦ Αἰγόκερω δύο συνεχῶν ὁ προηγούμενος	167° 40′, 6° 50′ S	IV	116-117.19	τῶν ὑπὸ τὴν κοιλίαν συνεχῶν β̄ ὁ ἡγούμενος	Cap 20° 10′, 6° 50′ S	IV
75	τῶν ἐν τῷ νώτῳ τοῦ Αἰγόκερω δύο ὁ ἑπόμενος	168° 20′, 0° 50′ S	IV	118-119.7	ὁ ἑπόμενος αὐτῶν (i.e. τῶν ἐν τῷ νώτῳ β̄)	Cap 21° 0′, 0° 50′ S	IV
76	τῶν ἐν τῇ νοτίῳ ἀκάνθῃ δύο ὁ προηγούμενος	170° 50′, 4° 45′ S	IV	118-119.8	τῶν ἐν τῇ νοτίῳ ἀκάνθῃ β̄ ὁ προηγούμενος	Cap 23° 20′, 4° 45′ S	IV
77	τῶν ἐν τῷ παρούρῳ τοῦ Αἰγόκερω δύο λαμπρῶν ὁ προηγούμενος	172° 20′, 2° 10′ S	III	118-119.10	τῶν ἐν τῷ παρούρῳ β̄ ὁ προηγούμενος	Cap 24° 50′, 2° 10′ S	III
78	τῶν ἐν τῇ νοτίῳ ἀκάνθῃ δύο ὁ ἑπόμενος	172° 30′, 4° 30′ S	IV	118-119.9	ὁ ἑπόμενος αὐτῶν (i.e. τῶν ἐν τῇ νοτίῳ ἀκάνθῃ β̄)	Cap 25° 0′, 4° 30′ S	IV
79	ὁ ἑπόμενος τῶν ἐν τῷ παρούρῳ δύο λαμπρῶν	173° 50′, 2° 0′ S	III	118-119.11	ὁ ἑπόμενος αὐτῶν (i.e. τῶν ἐν τῷ παρούρῳ β̄)	Cap 26° 20′, 2° 0′ S	III
80	ὁ ἐν τῷ ἡγουμένῳ ὤμῳ τοῦ Ὑδροχόου	174° 0′, 8° 50′ N	III	120-121.3	ὁ ἐν τῷ ἀριστερῷ ὤμῳ	Cap 26° 30′, 8° 50′ N	III
81	τῶν ἐν τῇ οὐρᾷ τοῦ Αἰγόκερω ὁ ἐκφανής	174° 20′, 0° 20′ N	IV	118-119.12	τῶν ἐπὶ τοῦ βορείου μέρους τῆς οὐρᾶς δ̄ ὁ προηγούμενος	Cap 26° 50′, 0° 20′ N	IV
82	ὁ ἐν τῷ προηγουμένῳ γλουτῷ τοῦ Ὑδροχόου, ὃν Ἵππαρχος καλεῖ ἀριστερὸν βουβῶνα	179° 10′, 1° 40′ S	IV	120-121.15	τῶν ἐν τῷ ἀριστερῷ γλουτῷ β̄ ὁ νότιος	Aqr 1° 40′, 1° 40′ S	IV
83	τῶν ἐπὶ τῆς ἑπομένης κοτύλης τοῦ Ὑδροχόου δύο ὁ λαμπρός	183° 40′, 3° 0′ S	IV	120-121.12	τῶν ἐν τῇ δεξιᾷ κοτύλῃ συνεχῶν β̄ ὁ προηγούμενος	Aqr 6° 10′, 3° 0′ S	IV
84	ὁ ἐπὶ τοῦ ἑπομένου μηροῦ τοῦ Ὑδροχόου, ὃν Ἵππαρχος καλεῖ δεξιὸν βουβῶνα	186° 10′, 0° 50′ S	IV	120-121.14	ὁ ἐπὶ τοῦ δεξιοῦ γλουτοῦ	Aqr 8° 40′, 0° 50′ S	IV
85	ὁ ἐν τῷ ἑπομένω πήχει τοῦ Ὑδροχόου καὶ ἡγούμενος τῆς κάλπιδος	187° 0′, 8° 45′ N	III	120-121.8	ὁ ἐν τῷ δεξιῷ πήχει	Aqr 9° 30′, 8° 45′ N	III

86	τῶν ἐν τῇ ἐπομένῃ κνήμῃ τοῦ Ὑδροχόου δύο ὁ βορειότερος	188° 50′, 5° 0′ S	IV	120-121.18	ὁ βορειότερος αὐτῶν (i.e. τῶν ἐν τῇ δεξιᾷ κνήμῃ $\overline{\beta}$) καὶ ὑπὸ τὴν ἀγκύλην	Aqr 11° 20′, 5° 0′ S	IV
87	ὁ νοτιώτερος τῶν δύο τῶν εἰρημένων	189° 10′, 7° 30′ S	III	120-121.17	τῶν ἐν τῇ δεξιᾷ κνήμῃ $\overline{\beta}$ ὁ νοτιώτερος	Aqr 11° 40′, 7° 30′ S	III
88	τῶν ἐν τῇ κάλπιδι νοτίων δύο καὶ ἑπομένων ὁ ἡγούμενος	189° 30′, 9° 0′ N	III	120-121.10	τῶν λοιπῶν καὶ βορείων $\overline{\beta}$ (scil. τῶν ἐπὶ τοῦ δεξιοῦ ἀκροχείρου $\overline{\gamma}$) ὁ προηγούμενος	Aqr 12° 0′, 9° 0′ N	III
89	ὁ ἑπόμενος τῶν δύο τῶν εἰρημένων	190° 50′, 8° 30′ N	III	120-121.11	ὁ ἑπόμενος αὐτῶν	Aqr 13° 20′, 8° 30′ N	III
90	τῶν ἐν τῷ Ὕδατι ἀπὸ τῆς κάλπιδος δύο ὁ νοτιώτερος	192° 20′, 0° 10′ N	IV	122-123.2	ὁ ἐχόμενος ἐκ νότου τοῦ προειρημένου (i.e. no. 91)	Aqr 14° 50′, 0° 10′ N	IV
91	ὁ βορειότερος τῶν δύο τῶν εἰρημένων	192° 30′, 2° 0′ N	IV	102-121.22	τῶν ἐπὶ τῆς ῥύσεως τοῦ ὕδατος ἀπὸ τῆς χειρὸς ὁ προηγούμενος	Aqr 15° 0′, 2° 0′ N	IV
92	τῶν ἐφεξῆς τοῦ ἐν τῷ ὕδατι τετραπλεύρου ὁ ἡγούμενος	195° 10′, 1° 10′ S	IV	122-123.3	ὁ τούτου (i.e. no. 90) ἐχόμενος μετὰ τὴν καμπήν	Aqr 17° 40′, 1° 10′ S	IV
93	ὁ νοτιώτερος τῶν ἐν τῷ τετραπλεύρῳ	196° 30′, 3° 30′ S	IV	122-123.6	τῶν ἀπὸ μεσημβρίας αὐτοῦ (i.e. no 96) $\overline{\beta}$ ὁ βορειότερος	Aqr 19° 0′, 3° 30′ S	IV
94	ὁ τούτῳ συνεχὴς καὶ ἀπὸ μεσημβρίας αὐτοῦ	197° 20′, 4° 10′ S	IV	122-123.7	ὁ νοτιώτερος τῶν δύο	Aqr 19° 50′, 4° 10′ S	IV
95	τῶν λοιπῶν καὶ ἑπομένων δύο τοῦ τετραπλεύρου ὁ βορειότερος	197° 30′, 0° 30′ S	IV	122-123.4	ὁ ἔτι τούτῳ (i.e. no. 92) ἑπόμενος	Aqr 20° 0′, 0° 30′ S	IV
96	ὁ νοτιώτερος τῶν δύο τῶν εἰρημένων	198° 0′, 1° 40′ S	IV	122-123.5	ὁ τούτου ἐν καμπῇ ἀπὸ μεσημβρίας	Aqr 20° 30′, 1° 40′ S	IV
97	ὁ ἐν τῷ στόματι τοῦ νοτίου Ἰχθύος	199° 10′, 9° 15′ N	IV	124-125.10	ὁ ἐν τῷ στόματι τοῦ προηγουμένου Ἰχθύος	Aqr 21° 40′, 9° 15′ N	IV
98	τῶν ἑπομένων αὐτῷ δύο καὶ ἐπὶ τοῦ κρανίου ὁ νοτιώτερος	201° 40′, 7° 30′ N	IV	124-125.11	τῶν ἐν τῷ κρανίῳ αὐτοῦ $\overline{\beta}$ ὁ νοτιώτερος	Aqr 24° 10′, 7° 30′ N	IV
99	ὁ βορειότερος τῶν δύο τῶν εἰρημένων	203° 30′, 9° 20′ N	IV	124-125.12	ὁ βορειότερος αὐτῶν	Aqr 26° 0′, 9° 20′ N	IV
100	τῶν ἐν τῇ κοιλίᾳ τοῦ νοτίου Ἰχθύος δύο ὁ ἡγούμενος	203° 30′, 4° 30′ N	IV	124-125.15	τῶν ἐν τῇ κοιλίᾳ $\overline{\beta}$ ὁ προηγούμενος	Aqr 26° 0′, 4° 30′ N	IV
101	τῶν ἐν τῷ νώτῳ τοῦ νοτίου Ἰχθύος δύο ὁ ἡγούμενος	205° 40′, 9° 30′ N	IV	124-125.13	τῶν ἐν τῷ νώτῳ $\overline{\beta}$ ὁ προηγούμενος	Aqr 28° 10′, 9° 30′ N	IV
102	τῶν εἰρημένων ἐν τῇ κοιλίᾳ δύο ὁ ἑπόμενος	207° 10′, 3° 30′ N	IV	124-125.16	ὁ ἑπόμενος αὐτῶν (i.e. τῶν ἐν τῇ κοιλίᾳ $\overline{\beta}$)	Aqr 29° 40′, 3° 30′ N	IV
103	τοῦ ὑπὸ τὸν νότιον Ἰχθὺν τετραπλεύρου ὁ ἡγούμενος	208° 10′, 5° 30′ S	IV	128-129.14	τῆς νοτίου πλευρᾶς (scil. τοῦ ὑπὸ τὸν ἡγούμενον Ἰχθὺν τετραπλεύρου) ὁ προηγούμενος	Psc 0° 40′, 5° 30′ S	IV
104	τῶν ἐν τῷ νώτῳ τοῦ νοτίου Ἰχθύος δύο ὁ ἑπόμενος	208° 10′, 7° 30′ N	IV	124-125.14	ὁ ἑπόμενος αὐτῶν (i.e. τῶν ἐν τῷ νώτῳ $\overline{\beta}$)	Psc 0° 40′, 7° 30′ N	IV

105	τῶν ἐν τῷ τετραπλεύρῳ δύο βορείων καὶ συνεχῶν ὁ ἡγούμενος	208° 40′, 2° 40′ S	IV	128-129.11-12	τοῦ ὑπὸ τὸν ἡγούμενον Ἰχθὺν τετραπλεύρου τῶν βορείων $\overline{\beta}$ ὁ ἡγούμενος	Psc 1° 10′, 2° 40′ S	IV
106	ὁ ἑπόμενος τῶν δύο τῶν συνεχῶν	209° 45′, 2° 30′ S	IV	128-129.13	ὁ ἑπόμενος αὐτῶν	Psc 2° 15′, 2° 30′ S	IV
107	ὁ λοιπὸς καὶ ἑπόμενος τοῦ ὑπὸ τὸν νότιον Ἰχθὺν τετραπλεύρου	209° 50′, 5° 30′ S	IV	128-129.15	ὁ ἑπόμενος τῆς νοτίου πλευρᾶς (scil. τοῦ ὑπὸ τὸν ἡγούμενον Ἰχθὺν τετραπλεύρου)	Psc 2° 20′, 5° 30′ S	IV
108	ὁ ἐπ᾽ ἄκρου τοῦ βορείου οὐραίου τοῦ Κήτους	212° 10′, 9° 40′ S	III -	132-133.4	τῶν ἐν ἄκροις τοῖς οὐραίοις $\overline{\beta}$ ὁ ἐπὶ τοῦ βορείου	Psc 4° 20′, 9° 40′ S	III -
109	ὁ ἐπ᾽ ἄκρας τῆς οὐρᾶς τοῦ νοτίου Ἰχθύος	213° 30′, 6° 20′ N	IV	124-125.17	ὁ ἐν τῇ οὐρᾷ τοῦ αὐτοῦ (scil. τοῦ προηγουμένου) Ἰχθύος	Psc 6° 0′, 6° 20′ N	IV
110	τῶν ἐν τῷ λίνῳ τοῦ νοτίου Ἰχθύος ἐκφανῶν ὁ ἡγούμενος	224° 40′, 2° 15′ N	IV	126-127.2	τῶν ἑφεξῆς (scil. κατὰ τὸ λίνον τοῦ προηγουμένου Ἰχθύος) λαμπρῶν $\overline{\gamma}$ ὁ προηγούμενος	Psc 17° 10′, 2° 15′ N	IV
111	ὁ τούτῳ ἑπόμενος	228° 0′, 1° 10′ N	IV	126-127.3	ὁ μέσος αὐτῶν	Psc 20° 30′, 1° 10′ N	IV
112	ὁ ἔτι τούτῳ ἑπόμενος καὶ τρίτος ἀπὸ τοῦ ἡγουμένου τῶν ἐκφανῶν	230° 30′, 0° 10′ S	IV	126-127.4	ὁ ἑπόμενος τῶν τριῶν	Psc 23° 0′, 0° 10′ S	IV
113	ὁ μετὰ τοῦτον καὶ τέταρτος ἀπὸ τοῦ ἡγουμένου τῶν ἐκφανῶν	233° 50′, 2° 20′ S	IV	126-127.7	τῶν μετὰ τὴν καμπὴν $\overline{\gamma}$ ὁ προηγούμενος	Psc 26° 30′, 2° 20′ S	IV
114	ὁ ἔτι τούτῳ ἑπόμενος καὶ πέμπτος ἀπὸ τοῦ ἡγουμένου	236° 10′, 4° 40′ S	IV	126-127.8	ὁ μέσος αὐτῶν	Psc 28° 40′, 4° 40′ S	IV
115	τῶν ἐν τῷ λίνῳ τοῦ βορείου Ἰχθύος ὁ λαμπρὸς καὶ βορειότερος	237° 50′, 5° 20′ N	III	126-127.13	ὁ μέσος αὐτῶν (i.e. τῶν ἐν τῷ βορείῳ λίνῳ μετὰ τὸν ἀπὸ τοῦ συνδέσμου προηγούμενον ἑφεξῆς $\overline{\gamma}$)	Ari 0° 40′, 5° 20′ N	III
116	ὁ νοτιώτερος τῶν εἰρημένων ἐν τῷ λίνῳ τοῦ βορείου Ἰχθύος	238° 0′, 1° 20′ S	IV	126-127.11	τῶν ἐν τῷ βορείῳ λίνῳ ὁ ἀπὸ τοῦ συνδέσμου προηγούμενος	Ari 0° 30′, 1° 40′ S	IV
117	ὁ κοινὸς τοῦ λίνου καὶ τῆς οὐρᾶς τοῦ βορείου Ἰχθύος	238° 0′, 9° 0′ N	IV	126-127.14	ὁ βόρειος τῶν $\overline{\gamma}$ (i.e. τῶν ἐν τῷ βορείῳ λίνῳ μετὰ τὸν ἀπὸ τοῦ συνδέσμου προηγούμενον ἑφεξῆς) καὶ ἐπ᾽ ἄκρας τῆς οὐρᾶς	Ari 0° 30′, 9° 0′ N	IV
118	ὁ προηγούμενος τοῦ ἐπὶ τοῦ συνδέσμου τῶν δύο λίνων	238° 10′, 7° 45′ S	IV	126-127.9	ὁ ἑπόμενος τῶν τριῶν (i.e. τῶν μετὰ τὴν καμπὴν)	Ari 0° 40′, 7° 45′ S	IV
119	ὁ ἐπ᾽ αὐτοῦ τοῦ συνδέσμου τῶν δύο λίνων λαμπρός	240° 0′, 8° 30′ S	III	126-127.10	ὁ ἐπὶ τοῦ συνδέσμου τῶν $\overline{\beta}$ λίνων	Ari 2° 30′, 8° 30′ S	III
120	τῶν ἐν τῇ κεφαλῇ τοῦ Κριοῦ τριῶν ὁ ἡγούμενος	244° 10′, 7° 20′ N	III	84-85.3	τῶν ἐπὶ τοῦ κέρως $\overline{\beta}$ ὁ προηγούμενος	Ari 1° 40′, 7° 20′ N	III -

121	τοῦ ὑπὸ τὸν Κριὸν ῥομβοειδοῦς τετραπλεύρου ἐπὶ τῆς κεφαλῆς τοῦ Κήτους ὁ ἡγούμενος	245° 10′, 4° 10′ S	IV	130-131.9	ὁ τούτων (i.e. τοῦ ἐπὶ τῆς ὀφρύος καὶ τοῦ ὀφθαλμοῦ and no. 124) προηγούμενος ὡς ἐπὶ τῆς χαίτης	Ari 7° 40′, 4° 10′ S	IV
122	ὁ μέσος τῶν τριῶν τῶν ἐν τῇ κεφαλῇ τοῦ Κριοῦ	245° 10′, 8° 20′ N	III	84-85.4	ὁ ἑπόμενος αὐτῶν (i.e. τῶν ἐπὶ τοῦ κέρως $\bar{\beta}$)	Ari 7° 40′, 8° 20′ N	III
123	ὁ ἑπόμενος τῶν εἰρημένων τριῶν	248° 10′, 10° 0′ N	III +	84-85.18	ὁ ὑπὲρ τὴν κεφαλήν, ὃν Ἵππαρχος ἐπὶ τοῦ ῥύγχους	Ari 10° 40′, 10° 30′ N	III +
124	τοῦ εἰρημένου ῥομβοειδοῦς τετραπλεύρου ὁ μετὰ τὸν ἡγούμενον	248° 10′, 5° 40′ S	IV	130-131.8	ὁ τούτου (i.e. τοῦ ἐπὶ τῆς ὀφρύος καὶ τοῦ ὀφθαλμοῦ) βορειότερος ὡς ἐπὶ τῆς τριχός	Ari 12° 40′, 6° 20′ S	IV
125	ὁ τρίτος ἀπὸ τοῦ ἡγουμένου καὶ ἐπὶ τοῦ ὀπισθίου σκέλους τοῦ Κριοῦ	252° 20′, 5° 15′ S	IV +	84-85.15	ὁ ἐπὶ τοῦ ὀπισθίου ἀκρόποδος	Ari 15° 0′, 5° 15′ S	IV +
126	ὁ ἑπόμενος τῶν ἐν τῷ ῥομβοειδεῖ τετραπλεύρῳ	255° 10′, 7° 45′ S	IV	130-131.3	ὁ ἐπ᾽ ἄκρου τοῦ μυκτῆρος	Ari 17° 40′, 7° 45′ S	IV
127	τῶν ἐν τῇ οὐρᾷ τοῦ Κριοῦ τριῶν ὁ προηγούμενος	261° 20′, 1° 40′ N	IV	84-85.10	τῶν ἐν τῇ οὐρᾷ $\bar{\gamma}$ ὁ προηγούμενος	Ari 23° 50′, 1° 40′ N	IV
128	τῶν ἐν τῇ ἀποτομῇ τοῦ Ταύρου τεσσάρων ὁ νοτιώτατος	261° 50′, 9° 15′ S	IV	86-87.10	ὁ νοτιώτατος τῶν $\bar{\delta}$ (i.e. τῶν ἐν τῇ ἀποτομῇ)	Ari 24° 20′, 9° 15′ S	IV
129	τῶν εἰρημένων ὁ δεύτερος ἀπὸ τοῦ νοτιοτάτου	262° 10′, 8° 30′ S	IV	86-87.9	ὁ ἔτι τούτου (i.e. no. 131) ἐχόμενος	Ari 24° 20′, 8° 30′ S	IV
130	τῶν προειρημένων ἐν τῇ οὐρᾷ τοῦ Κριοῦ τριῶν ὁ μέσος	262° 50′, 2° 30′ N	IV	84-85.11	ὁ μέσος τῶν τριῶν (scil. τῶν ἐν τῇ οὐρᾷ)	Ari 25° 20′, 2° 30′ N	IV
131	τῶν ἐν τῇ ἀποτομῇ τοῦ Ταύρου τεσσάρων ὁ δεύτερος ἀπὸ τοῦ βορειοτάτου	263° 30′, 7° 15′ S	IV	86-87.8	ὁ ἐχόμενος αὐτοῦ (i.e. no. 132)	Ari 26° 0′, 7° 15′ S	IV
132	ὁ βορειότατος τῶν ἐν τῇ ἀποτομῇ	263° 50′, 6° 0′ S	IV	86-87.7	τῶν ἐν τῇ ἀποτομῇ $\bar{\delta}$ ὁ βόρειος	Ari 26° 20′, 6° 0′ S	IV
133	τῶν εἰρημένων ἐν τῇ οὐρᾷ τοῦ Κριοῦ τριῶν ὁ ἑπόμενος	264° 30′, 1° 50′ N	IV	84-85.12	ὁ ἑπόμενος αὐτῶν (i.e. τῶν ἐν τῇ οὐρᾷ $\bar{\gamma}$)	Ari 27° 0′, 1° 50′ N	IV
134	τῆς Πλειάδος τὸ βόρειον πέρας τῆς ἡγουμένης πλευρᾶς	269° 40′, 4° 30′ N	neb.	90-91.2	τῆς Πλειάδος τὸ βόρειον πέρας τῆς ἡγουμένης πλευρᾶς	Tau 2° 10′, 4° 30′ N	V
135	τὸ νότιον πέρας τῆς ἡγουμένης πλευρᾶς τῆς Πλειάδος	270° 0′, 3° 40′ N	neb.	90-91.3	τὸ νότιον πέρας τῆς ἡγουμένης πλευρᾶς	Tau 2° 30′, 3° 40′ N	V
136	τὸ μέσον τῆς Πλειάδος τῆς ἡγουμένης πλευρᾶς	270° 30′, 4° 0′ N	neb.	absent	absent	absent	absent
137	τὸ ἑπόμενον καὶ στενότατον μέρος τῆς Πλειάδος	271° 10′, 2° 20′ N	neb.	90-91.4	τὸ ἑπόμενον καὶ στενότατον πέρας τῆς Πλειάδος	Tau 3° 40′, 2° 20′ N	V
138	ὁ ἐν τῷ στήθει τοῦ Ταύρου	271° 10′, 8° 0′ S	III	86-87.12	ὁ ἐν τῷ στήθει	Tau 3° 40′, 8° 0′ S	III
139	ὁ ἀπὸ ἄρκτων τῆς Πλειάδος	271° 10′, 5° 0′ N	IV	90-91.5	ὁ ἔκτος καὶ μικρὸς τῆς Πλειάδος ἀπ᾽ ἄρκτων	Tau 3° 40′, 5° 0′ N	IV

140	τῶν ἐν τῇ Ὑάδι ὁ ἡγούμενος καὶ ἐπὶ τοῦ ῥύγχους τοῦ Ταύρου	276° 30′, 5° 45′ S	III -	86-87.17	τῶν ἐν τῷ προσώπῳ καλουμένων Ὑάδων ὁ ἐπὶ τῶν μυκτήρων	Tau 9° 0′, 5° 45′ S	III -
141	τῶν ἑπομένων αὐτῷ δύο ἐπὶ τῶν ὀφθαλμῶν ὁ βορειότερος	277° 50′, 4° 15′ S	III -	86-87.18	ὁ μεταξὺ τούτου καὶ τοῦ βορείου ὀφθαλμοῦ	Tau 10° 20′, 4° 15′ S	III -
142	ὁ νοτιώτερος τῶν δύο τῶν εἰρημένων	278° 20′, 5° 50′ S	III -	86-87.19	ὁ μεταξὺ αὐτοῦ καὶ τοῦ νοτίου ὀφθαλμοῦ	Tau 10° 50′, 5° 50′ S	III -
143	τῶν λοιπῶν καὶ ἑπομένων δύο ὁ βορειότερος	279° 20′, 3° 0′ S	III -	88-89.3	ὁ λοιπὸς καὶ ἐπὶ τοῦ βορείου ὀφθαλμοῦ	Tau 11° 50′, 3° 0′ S	III -
144	ὁ ἐπὶ τοῦ ἑπομένου γόνατος τοῦ Ταύρου	279° 40′, 10° 0′ S	IV	86-87.15	ὁ ἐπὶ τοῦ ἀριστεροῦ γόνατος	Tau 12° 10′, 10° 0′ S	IV
145	ὁ λοιπὸς τῶν ἐν τῇ Ὑάδι, καλούμενος Λαμπρός	280° 10′, 5° 10′ S	I	88-89.2	ὁ λαμπρὸς τῶν Ὑάδων ἐπὶ τοῦ νοτίου ὀφθαλμοῦ ὑπόκιρρος	Tau 12° 40′, 5° 10′ S	I
146	ὁ ἐπὶ τῆς ἐκφύσεως τοῦ βορείου κέρατος τοῦ Ταύρου	283° 10′, 0° 15′ S	IV	88-89.8	ὁ ἐπὶ τῆς ἐκφύσεως τοῦ βορείου κέρατος	Tau 15° 40′, 0° 15′ S	IV
147	ὁ ἐπὶ τῆς ἐκφύσεως τοῦ νοτίου κέρατος τοῦ Ταύρου	284° 40′, 4° 0′ S	IV	88-89.4	ὁ ἐπὶ τῆς ἐκφύσεως τοῦ νοτίου κέρατος καὶ τοῦ ὠτίου	Tau 17° 30′, 4° 0′ S	IV
148	τῶν ἐν τῇ δορᾷ τοῦ Ὡρίωνος δύο συνεχῶν ὁ ἡγούμενος	286° 50′, 8° 10′ S	IV	134-135.8	ὁ $\overline{\beta}$ ἀπὸ τοῦ βορειοτάτου (scil. τῶν ἐν τῇ δορᾷ τῆς ἀριστερᾶς χειρὸς)	Tau 19° 20′, 8° 10′ S	IV
149	ὁ ἑπόμενος τῶν δύο τῶν εἰρημένων	288° 0′, 8° 0′ S	IV	134-135.7	τῶν ἐν τῇ δορᾷ τῆς ἀριστερᾶς χειρὸς ὁ βόρειος	Tau 20° 30′, 8° 30′ S	IV
150	ὁ ἐπ᾽ ἄκρου τοῦ βορείου κέρατος καὶ κοινὸς τοῦ ποδὸς τοῦ Ἡνιόχου	293° 10′, 5° 0′ N	III	88-89.9-10	ὁ ἐπ᾽ ἄκρου τοῦ βορείου κέρατος ὁ αὐτὸς τῷ ἐπὶ τοῦ δεξιοῦ ποδὸς τοῦ Ἡνιόχου	Tau 25° 40′, 5° 0′ N	III
151	ὁ ἐπ᾽ ἄκρου τοῦ νοτίου κέρατος τοῦ Ταύρου	295° 10′, 2° 10′ S	III	88-89.7	ὁ ἐπ᾽ ἄκρου τοῦ νοτίου κέρατος	Tau 27° 40′, 2° 30′ S	III
152	ὁ προηγούμενος τοῦ Πρόποδος τοῦ ἡγουμένου Διδύμου	301° 40′, 0° 40′ S	IV	94-95.5	ὁ προηγούμενος τοῦ πρόποδος τοῦ ἡγουμένου Διδύμου	Gem 4° 10′, 0° 40′ S	IV
153	τῶν ἐν τῇ δεξιᾷ λαβῇ τοῦ Ὡρίωνος δύο ἐκφανῶν ὁ προηγούμενος	303° 30′, 9° 45′ S	IV	132-133.16	ὁ προηγούμενος τῆς νοτίου πλευρᾶς (scil. τοῦ ἐν τῷ δεξιῷ ἀκροχείρῳ τετραπλεύρου)	Gem 6° 0′, 9° 45′ S	IV
154	ὁ ἑπόμενος τῶν εἰρημένων δύο ἐκφανῶν	304° 0′, 10° 0′ S	IV +	132-133.14-15	τοῦ ἐν τῷ δεξιῷ ἀκροχείρῳ τετραπλεύρου τῆς νοτίου πλευρᾶς ὁ ἑπόμενος καὶ διπλοῦς	Gem 6° 30′, 10° 0′ S	IV
155	ὁ προηγούμενος τῶν γονάτων τῶν Διδύμων ὡς ἐπ᾽ εὐθείας αὐτῶν	304° 0′, 5° 50′ N	IV +	94-95.6	ὁ προηγούμενος τοῦ ἡγουμένου γόνατος λαμπρός	Gem 6° 30′, 5° 50′ N	IV +
156	τῶν ἐν τῷ ποδὶ τοῦ ἡγουμένου Διδύμου ὁ καλούμενος Πρόπους	304° 0′, 1° 30′ S	IV +	92-93.16	ὁ ἐπὶ τοῦ πρόποδος τοῦ ἡγουμένου Διδύμου	Gem 6° 30′, 1° 30′ S	IV +
157	ὁ ἑπόμενος αὐτῷ καὶ καλούμενος Ποὺς ἡγούμενος	305° 40′, 1° 15′ S	IV +	92-93.17	ὁ τούτῳ ἑπόμενος ἐπὶ τοῦ αὐτοῦ ποδός	Gem 8° 30′, 1° 15′ S	IV +

158	ὁ τούτου νοτιώτερος καὶ ἐπὶ τοῦ δευτέρου ποδὸς τοῦ δεξιοῦ Διδύμου	307° 40′, 3° 30′ S	IV +	92-93.18	ὁ ἐπὶ τοῦ δεξιοῦ ἀκρόποδος τοῦ ἡγουμένου Διδύμου	Gem 10° 10′, 3° 30′ S	IV +
159	ὁ ἔτι τούτου νοτιώτερος καὶ ἐπὶ τοῦ τρίτου ποδὸς ἐκφανής	309° 30′, 7° 30′ S	III	92-93.19	ὁ ἐπὶ τοῦ ἀριστεροῦ ἀκρόποδος τοῦ ἑπομένου Διδύμου	Gem 12° 0′, 7° 30′ S	III
160	τῶν ἐν τοῖς γόνασι τῶν Διδύμων ὡς ἐπ᾽ εὐθείας τριῶν ὁ ἡγούμενος	310° 30′, 1° 30′ N	III	92-93.12	ὁ ἐπὶ τοῦ ἀριστεροῦ γόνατος τοῦ ἡγουμένου Διδύμου	Gem 13° 0′, 1° 30′ N	III
161	ὁ ἐν τῷ ἡγουμένῳ πήχει τοῦ ἡγουμένου Διδύμου	314° 10′, 10° 0′ N	IV	92-93.5	ὁ ἐν τῷ ἀριστερῷ πήχει τοῦ ἡγουμένου Διδύμου	Gem 16° 40′, 10° 0′ N	IV
162	τῶν εἰρημένων ἐν τοῖς γόνασι τῶν Διδύμων τριῶν ὁ μέσος	315° 45′, 2° 30′ S	III	92-93.13	ὁ ὑπὸ τὸ ἀριστερὸν γόνυ τοῦ ἑπομένου Διδύμου	Gem 18° 15′, 2° 30′ S	III
163	τῶν ἐν τοῖς ὤμοις τῶν Διδύμων ὁ ἡγούμενος	316° 10′, 7° 20′ N	IV	92-93.6	ὁ ἐν τῷ αὐτῷ (i.e. τῷ ἀριστερῷ τοῦ ἡγουμένου Διδύμου) βραχίονι	Gem 18° 40′, 7° 20′ N	IV
164	ὁ ὑπὲρ τὰ γόνατα, ὃν Ἵππαρχος καλεῖ Ὀμφαλόν	319° 10′, 0° 30′ S	III	92-93.14	ὁ ἐν τῷ ἀριστερῷ βουβῶνι τοῦ ἑπομένου Διδύμου	Gem 21° 40′, 0° 30′ S	III
165	ὁ λοιπὸς καὶ ἑπόμενος τῶν ἐν τοῖς γόνασι τῶν Διδύμων τριῶν	319° 10′, 6° 0′ S	III	92-93.15	ὁ ὑπὲρ τὴν δεξιὰν ἀγκύλην τοῦ αὐτοῦ Διδύμου	Gem 21° 40′, 6° 0′ S	III
166	τῶν ἐν τοῖς ὤμοις τῶν Διδύμων ὁ μετὰ τὸν ἡγούμενον	319° 30′, 5° 30′ N	IV	92-93.7	ὁ ἑπόμενος αὐτῷ (i.e. no. 163) καὶ κατὰ τοῦ μεταφρένου	Gem 22° 0′, 5° 30′ N	IV
167	ὁ ἐπὶ τῆς κεφαλῆς τοῦ ἡγουμένου Διδύμου	320° 50′, 9° 40′ N	II	92-93.3	ὁ ἐπὶ τῆς κεφαλῆς τοῦ ἡγουμένου Διδύμου	Gem 23° 20′, 9° 30′ N	II
168	ὁ ὑπ᾽ αὐτὸν καὶ τρίτος τῶν ἐν τοῖς ὤμοις	321° 30′, 4° 50′ N	IV	92-93.8	ὁ τούτῳ (i.e. no. 166) ἑπόμενος ἐπὶ τοῦ δεξιοῦ ὤμου τοῦ αὐτοῦ Διδύμου	Gem 24° 0′, 4° 50′ N	IV
169	ὁ λοιπὸς καὶ ἑπόμενος τῶν ἐν τοῖς ὤμοις	324° 10′, 2° 40′ N	IV	92-93.9	ὁ ἐπὶ τοῦ ἑπομένου ὤμου τοῦ ἑπομένου Διδύμου	Gem 26° 40′, 2° 40′ N	IV
170	ὁ ἐπὶ τῆς κεφαλῆς τοῦ ἑπομένου Διδύμου	324° 10′, 6° 15′ N	II	92-93.4	ὁ ἐπὶ τῆς κεφαλῆς τοῦ ἑπομένου Διδύμου ὑπόκιρρος	Gem 26° 40′, 6° 15′ N	II
171	ὁ ἑπόμενος τῇ χειρὶ τοῦ ἑπομένου Διδύμου	328° 10′, 2° 40′ S	IV +	94-95.12	ὁ ἑπόμενος τοῖς προειρημένοις $\overline{\gamma}$ (i.e. τοῖς ἑπομένοις τῇ δεξιᾷ χειρὶ τοῦ ἑπομένου Διδύμου τριῶν ἐπ᾽ ευθείας) λαμπρός	Cnc 0° 40′, 2° 40′ S	IV
172	ὁ ἔτι τούτῳ ἑπόμενος ἀπὸ μεσημβρίας	334° 40′, 7° 30′ S	IV +	96-98.8	ὁ ἐπὶ τοῦ ὀπισθίου νοτίου ποδός (scil. τοῦ Καρκίνου)	Cnc 7° 10′, 7° 30′ S	IV +
173	τῶν προηγουμένων δύο τοῦ νεφελίου <τοῦ> Καρκίνου ὁ βορειότερος	335° 10′, 1° 15′ N	IV -	94-95.17-18	τοῦ περὶ τὸ νεφέλιον τετραπλεύρου τῶν προηγουμένων $\overline{\beta}$ ὁ βορειότερος	Cnc 7° 40′, 1° 15′ N	IV -
174	ὁ νοτιώτερος τῶν δύο τῶν εἰρημένων	335° 30′, 1° 10′ S	IV -	94-95.19	ὁ νοτιώτερος τῶν προηγουμένων $\overline{\beta}$	Cnc 8° 0′, 1° 10′ S	IV -
175	ὁ μέσος τοῦ νεφελίου τοῦ ἐν τῷ μέσῳ τοῦ Καρκίνου, καλούμενος Φάτνη	337° 50′, 0° 40′ N	neb.	94-95.15-16	τῆς ἐν τῷ στήθει νεφελοειδοῦς συστροφῆς καλουμένης Φάτνης τὸ μέσον	Cnc 10° 20′, 0° 20′ N	neb.

176	τῶν ἑπομένων τοῦ νεφελίου δύο, καλουμένων Ὄνων, ὁ βορειότερος	337° 50’, 2° 40’ N	IV +	96-97.2-3	τῶν ἑπομένων τοῦ τετραπλεύρου $\overline{\beta}$ καλουμένων δὲ Ὄνων ὁ βόρειος	Cnc 10° 20’, 2° 40’ N	IV +
177	ὁ νοτιώτερος τῶν Ὄνων	338° 50’, 0° 10’ S	IV +	96-97.4	ὁ νότιος τῶν προειρημένων $\overline{\beta}$	Cnc 11° 20’, 0° 10’ S	IV +
178	ὁ ὑπὲρ τὸν ἀγκῶνα τῆς νοτίου χηλῆς τοῦ Καρκίνου	342° 40’, 2° 20’ S	IV +	96-97.11	ὁ ὑπὲρ τὸν ἀγκῶνα τῆς νοτίου χηλῆς	Cnc 19° 40’, 2° 20’ S	IV -
179	ὁ ἐπ᾽ ἄκρας τῆς νοτίου χηλῆς τοῦ Καρκίνου	344° 0’, 5° 30’ S	IV	96-97.5	ὁ ἐπὶ τῆς νοτίου χηλῆς	Cnc 16° 30’, 5° 30’ S	IV
180	ὁ ἐπ᾽ ἄκρου τοῦ μυκτῆρος τοῦ Λέοντος	345° 50’, 10° 0’ N	IV	96-97.17	ὁ ἐπ’ ἄκρου τοῦ μυκτῆρος	Cnc 18° 20’, 10° 0’ N	IV
181	ὁ ἐν τῷ χάσματι τοῦ Λέοντος	348° 40’, 7° 30’ N	IV	96-97.18	ὁ ἐν τῷ χάσματι	Cnc 21° 10’, 7° 30’ N	IV
182	ὁ ἑπόμενος τῷ ἐπ᾽ ἄκρας τῆς νοτίου χηλῆς τοῦ Καρκίνου	349° 10’, 5° 40’ S	IV -	96-97.12	ὁ ἑπόμενος τῷ ἄκρῳ τῆς νοτίου χηλῆς	Cnc 21° 10’, 5° 40’ S	IV -
183	τῶν ἐν τῇ κεφαλῇ τοῦ Λέοντος δύο ὁ νοτιώτερος	351° 40’, 9° 30’ N	III +	98-99.2	ὁ νοτιώτερος αὐτῶν (i.e. τῶν ἐν τῇ κεφαλῇ $\overline{\beta}$)	Cnc 24° 10’, 9° 30’ N	III +
184	ὁ ἐπὶ τῆς ἡγουμένης δρακὸς τοῦ Λέοντος	354° 50’, 4° 10’ S	IV +	98-99.11	ὁ ἐπὶ τῆς ἐμπροσθίας καὶ ἀριστερᾶς δρακός	Cnc 27° 20’, 4° 10’ S	IV
185	τῶν ἐν τῷ τραχήλῳ τοῦ Λέοντος τριῶν ὁ νοτιώτερος	358° 10’, 4° 30’ N	III	98-99.5	ὁ νότιος αὐτῶν (i.e. τῶν ἐν τῷ τραχήλῳ $\overline{\gamma}$)	Leo 0° 40’, 4° 30’ N	III
186	ὁ μέσος τῶν ἐν τῷ τραχήλῳ τοῦ Λέοντος τριῶν	359° 40’, 8° 30’ N	II	98-99.4	ὁ ἐχόμενος καὶ μέσος τῶν τριῶν	Leo 2° 10’, 8° 30’ N	II

Notes on the comparison of the two star catalogues

1) Overall organization

The basic organisational unit in the *Almagest* star catalogue (following the earlier tradition of Aratus, Eratosthenes, and probably also Hipparchus), is not the single star, but rather the constellation. Proceding roughly from north to south, Ptolemy describes each constellation listing all the stars pertaining to it or positioned around it: each star is defined by the mention of its relative position within the constellation, as well as numerically by its absolute position in ecliptical coordinates. The sequence in which the stars are listed within each constellation does not follow a strictly topographic criterion, but rather derives from the place of each star within the (mental or cartographical) image of the constellation itself. This method is coherent with the purpose of the star catalogue of the *Almagest*, i.e. providing the database to fabricate a celestial sphere: following the star catalogue, the astronomer will be able to mark all the stars of each constellation in their correct positions on the surface of the sphere;

after having marked all the individual stars, he will finally group them (or he will have them grouped by a professional drawer) by means of an outline graphically suggesting the shape of the desired constellation.

On the contrary, the star catalogue of A20 is organised strictly by longitude: taking as reference point the star α Leo (*Regulus*), which is particularly apt for this purpose, being of first magnitude and positioned exactly on the ecliptic (i.e. with ϕ = 0° 0'), Ptolemy follows this circle in retrograde direction (εἰς τὰ ἑπόμενα), listing every star up to the fourth magnitude located within a distance of 10° north or south. The sequence in which the stars are listed depends exclusively on their distance in longitude from α Leo, while their pertinence to different constellations is systematically ignored. Again, this organisational choice is a consequence of the purpose of the table, which is to provide a frame of reference to register the observations of celestial phenomena, in particular of planetary motions: in this way, the astronomer will be able to retrieve easily the absolute position of the fixed star(s) closer to the point where the observed phenomenon has occurred; the fact that the reference point is, in turn, a fixed star allows the user to ignore the effect of precession, immediately providing the absolute location of any desired point in the vicinity of the ecliptic.

2) Star names

The fact that the stars are not organised by constellations compels the author to be more precise than in the *Almagest* in naming their positions: therefore, constellation names are frequently repeated, and many stars are defined on the basis of their spatial relation to the preceding one(s). However, in the identification of specific stars some significant deviations from the *Almagest* can be observed. An immediate consequence of the different organization principle, which I have discussed above, is the fact that many indications referring to the way of drawing a constellation, normally found in the star catalogue of the *Almagest* (e.g. the 'right' and 'left' limbs of a human figure, or the 'front' and 'back' of an animal), are replaced by more abstract reference points, such as 'preceding' and 'following', or 'northern' and 'southern': these allow the author to express the spatial relations between single stars without depending on the mental or cartographical images of the respective constellations.

The transmission of the star names in A20 is particularly problematic because of the massive usage of abbreviations by the scribes, due to the space constraints of the table format. Among the four manuscripts taken into consideration for the present edition, **H** is the smallest in format, and therefore also the most affected by shortening necessities: its scribe uses every kind of abbreviation rather freely, so that in many cases it is quite hard to imagine what exactly the implied reading would have been. The situation is further complicated by the fact that abbreviations usually affect the endings of the words: as a result, sometimes it can be difficult to reconstruct the concurrences of articles, substantives and adjectives as intended by the scribe. This fact has led to considerable problems in the other three manuscripts too. In their current form they are much less abbreviated than **H**, but their tradition must have experienced at a certain point a highly abbreviated stage: the text has then been re-expanded

and written down in full, but in many cases the scribes had simply no clue how to reconstruct the original concurrences. The majority of my interventions on the text concern precisely the restoration of the correct endings in the star names.

An interesting feature of the star names in A20 is the presence of references to Hipparchus: Ptolemy's predecessor is quoted eight times in the table, while he is mentioned only one time in the whole star catalogue of the *Almagest* (Ptol. *Alm.* 7.5, vol. 2, pp. 84-85, l. 18 Heiberg = A20, no. 123; indeed, the very exceptionality of this reference may well suggest that this is actually a gloss which entered the text of the *Almagest* at a later stage). It seems that Ptolemy wanted the readers of the *Handy Tables* to be able to associate particular stars, probably those which he decided to identify with a slightly different name, with their correspondents in Hipparchus' work, in order to make the comparison between the two catalogues easier. The fact that Ptolemy somewhat expects his readers to be familiar with Hipparchus' denominations of some stars is in itself very interesting, and is a good document of the reception of this Hellenistic author in the imperial period.

The overall tendency towards a more precise identification of the individual stars, independently from their belonging to a specific constellation, leads Ptolemy to remove, in some instances, the reference to the position of a star within its constellation (as is commonly found in the *Almagest* star catalogue) replacing it with abstract geometrical shapes. This is the case of the several 'quadrilaterals' (τετράπλευρα) found in A20, which define four stars simply through their geometric relation to one another. To be sure, such shapes are present in the *Almagest* too: e.g. the one in Virgo's left thigh (Ptol. *Alm.* 7.5, vol. 2, pp. 102-103, l. 18 – 104-105, l. 4 Heiberg), only one star of which is actually bright enough to be included in A20 (no. 17); or the one under the constellation of Pisces (Ptol. *Alm.* 8.1, vol. 2, pp. 128-129, ll. 11-15 Heiberg), whose four stars are all mentioned in the table (nos. 103, 105, 106, 107). Three new τετράπλευρα, not found in the *Almagest*, are introduced in A20, in the constellations of Sagittarius (nos. 54, 56, 57, 59), Aquarius (nos. 92, 93, 95, 96), and Cetus (nos. 121, 124, 125, 126) respectively: since the encompassing frame of the respective constellations is absent from the table, such references make an important contribution towards a better appreciation of the spatial relations between the involved stars. Other quadrilaterals present in the *Almagest*, however, are not found in the *Handy Tables*: the one in Orion's right hand (Ptol. *Alm.* 8.1, vol. 2, pp. 132-133, ll. 14-18 Heiberg), only two stars of which are bright enough to be included in A20 (nos. 153-154); and the one around the Manger, in the constellation of Cancer (Ptol. *Alm.* 7.5, vol. 2, pp. 94-95, l. 17 – 96-97, l. 4 Heiberg): in this case, all the stars in the quadrilateral are mentioned in A20 (nos. 173, 174, 176, 177), but the author chose to privilege the spatial relation of each of them with the Manger, rather than referring to their disposition in a quadrilateral shape.

Taurus is the constellation which shows the most considerable variations with respect to the *Almagest* star catalogue. Not only it features one star which is absent from the *Almagest* (no. 136, identifiable as Maia), but its treatment also implies a different disposition of the stars within the mental and cartographical image of the constellation itself: in particular, the stars identified as the eyes of Taurus in A20 are δ Tau and θ Tau (nos. 141-142), instead of ε Tau and α Tau (nos. 143 and 145) as reported in the *Almagest*.

3) Star positions

The first and most striking difference between the star positions in A20 and those in the *Almagest* star catalogue concerns the way in which the fractions of degrees are written (although this cannot be appreciated from the comparative table above, where I decided, out of practical grounds, to 'translate' all coordinates in the modern system of degrees and minutes): while in the *Almagest* Ptolemy uses simple fractions with different denominators (1/6, 1/4, 1/3, 1/2, 2/3, 1/2+1/4, 1/2+1/3), in A20 he always expresses these values in minutes (λεπτά) – that is, by using only fractions implying 60 as a denominator, just as happens in the modern system. This different notation, of course, could theoretically allow a better precision, but in fact Ptolemy always uses only the same round numbers (10', 15', 20', 30', 40', 45', 50') which could be expressed through the simple fractions found in the *Almagest*. Therefore, we should interpret this change not as a way to achieve more precision, but simply as an arithmetical tool to make calculations easier: the notation used in A20 allows the reader to perform simple additions and subtractions in base 60, with no need of the geometric reasoning required for the addition and subtraction of fractions with different denominators; the latter system, on the contrary, is surely better suited to the purpose of marking the positions of the stars on the surface of a celestial sphere, which is precisely the goal of the *Almagest* star catalogue.

Compared with the difficulties derived from the abbreviation and re-expansion of the star names, the positions of the individual stars have been transmitted much more carefully and with a limited number of variants: this fact makes a comparison with the numerical data of the *Almagest* quite easy, and extremely fruitful. Differences in the star coordinates between A20 and the *Almagest* are found in 45 instances, i.e. ca. 25% of the total of 186 stars; not all of them, however, are equally significant:

- In three instances (nos. 9, 110, 138) the reading of the manuscripts of A20 is certainly erroneous, implying a difference between 1° 40' and 3° 0' with respect to the data found in the *Almagest*: in these cases I have restored in the text of A20 the reading of the *Almagest*, explaining the manuscript evidence as the consequence of simple scribal confusions (between βο. and νο., B and E, A and Δ, respectively).

- In no less than 15 instances, the numerical data found in A20 do not match with those chosen by Heiberg for his edition, but are actually transmitted by some manuscripts of the *Almagest*, and are duly mentioned as *variae lectiones* by Heiberg in his *apparatus criticus*. This phenomenon may of course derive from a number of reasons: if we interpret these readings as correct, the comparison with A20 could lead to a reassessment of the relative reliability of the main manuscripts of the *Almagest*; but a different scenario could be easily envisaged, namely the comparison of exemplars of the two star catalogues by Byzantine scribes and their contemporary correction with one another. Only an integrated study of the tradition of the two Ptolemaic works will hopefully clarify their relations, as well as the role of Byzantine intellectuals in the transmission of the star coordinates.

- There are 29 cases in which the data of A20 do not match those in the *Almagest*, and (at least according to Heiberg's *apparatus criticus*) do not appear in any of the extant manuscripts of the main Ptolemaic work. I will not deal here with minor differences regarding the magnitude of some stars, since small features such as με. and ἐλ. can easily have been dropped during the copying process of both the *Almagest* and the *Handy Tables*. But, even if we limit ourselves to the strictly numerical data of longitude and latitude, there are no less than 13 cases in which the coordinates in A20 are different from those found in the *Almagest*: they are fairly evenly distributed between longitude and latitude values, showing differences between 10' and 30' with respect to the data found in the *Almagest*. Most of these inconsistencies are not easily explicable on palaeographical grounds as results of simple scribal confusions, and in my opinion can better be interpreted as purposeful variants; it is of course impossible, in the absence of earlier papyrological evidence of the type we have for the table of oblique ascension, to decide whether these inconsistencies are to be interpreted as authorial variants, or rather as product of a revision occurred at some stage of transmission.

Finally, in a number of cases, the text of A20 allows some improvements to the current edition of the *Almagest*:

- no. 46 offers a more accurate longitude for ξ Oph, a value which Heiberg discarded but duly mentioned in his *apparatus criticus*.
- no. 49 gives a different magnitude for the star d Oph than that found in Heiberg's edition of the *Almagest* (IV + instead of V +); this cannot be interpreted as a scribal error, since, if the lesser magnitude attributed to it by Heiberg were right, this star should not have been included at all in A20.
- the case of no. 123 is similar. The latitude of α Ari in A20 is 10° 0' N, a reading which is attested in some manuscripts of the *Almagest* but which Heiberg discards in his edition, printing 10° 30'; but the latter value, if right, would have prevented the inclusion of the star in A20.
- no. 124 offers the accurate position of the star ξ^2 Cet: the coordinates found in Heiberg's edition (and in all manuscripts of the *Almagest*, if we believe his *apparatus criticus*) do not correspond to any star known to modern constellation maps.
- no. 137 provides the reading «τὸ ἐπόμενον καὶ στενότατον μέρος τῆς Πλειάδος», which is certainly better than Heiberg's «τὸ ἐπόμενον καὶ στενότατον πέρας τῆς Πλειάδος», since it is unlikely that a 'limit' has a thickness.
- no. 178 gives a more accurate value for the longitude of o Cnc: the error, present in all the manuscripts of the *Almagest*, is probably the consequence of a rather banal scribal confusion between E and Θ in majuscule script.